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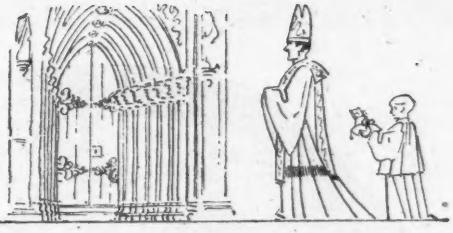

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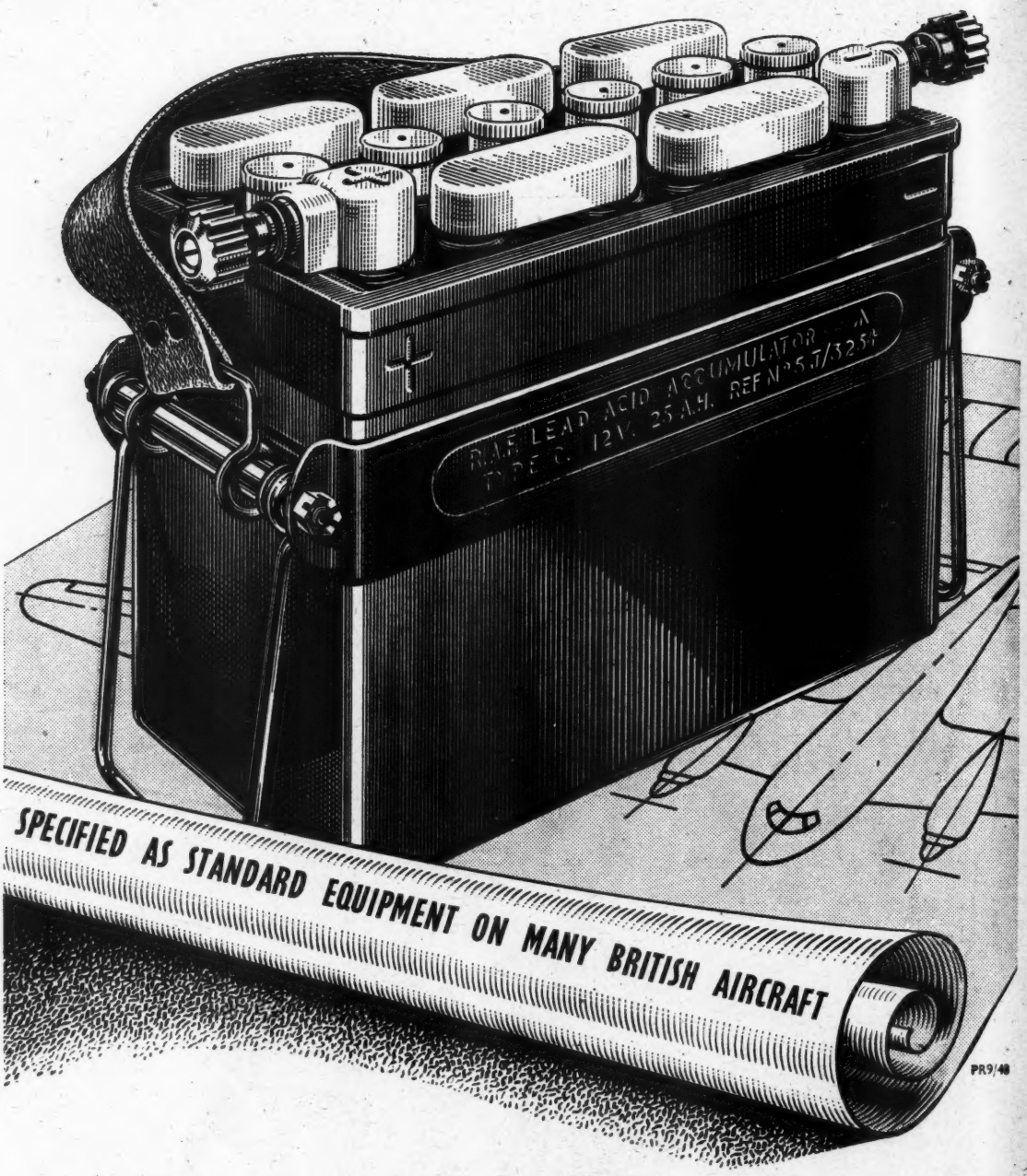

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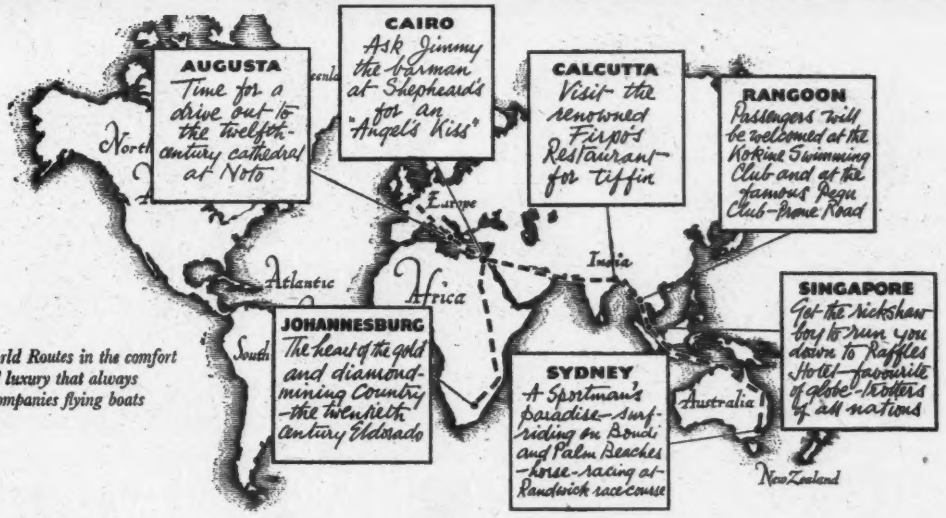
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Experienced operators of airlines, such as Imperial Airways before the war and now B.O.A.C., have dealt with every type of passenger over many years. They feel that if this type of business man exists at all he is so rare as to be almost legendary. They have other, and quite different, ideas of what the modern business man requires on his long or short journeys, by air. He wants to *waste* no time; travel in comfort, and have as pleasant a break from business routine as possible.

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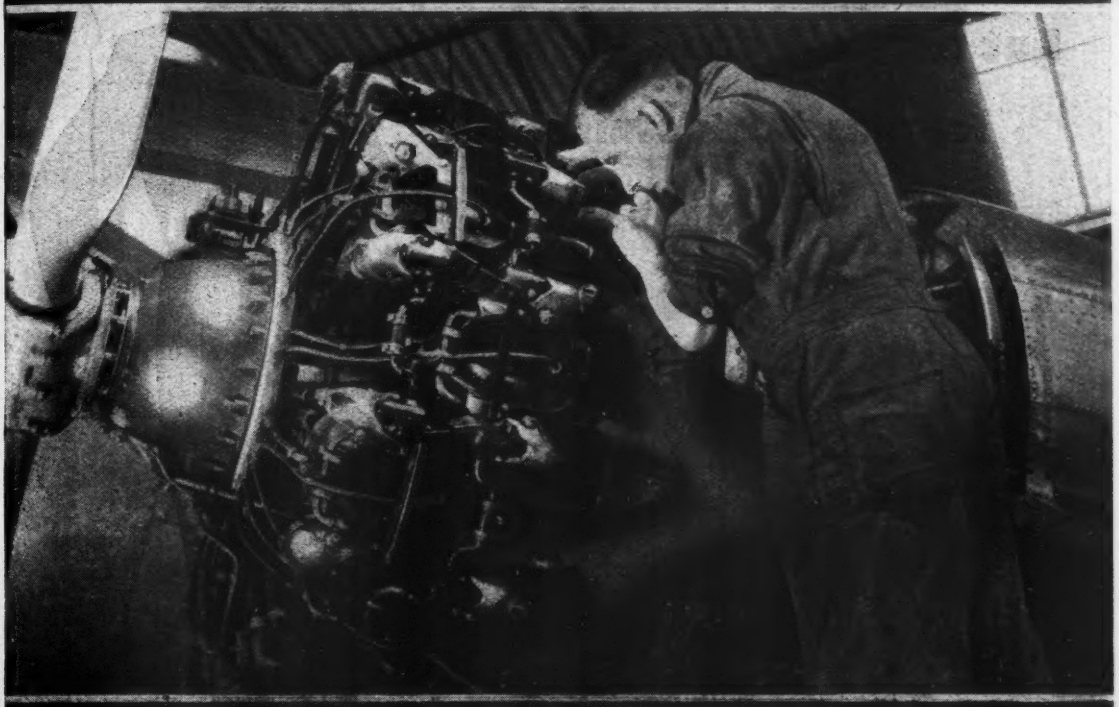

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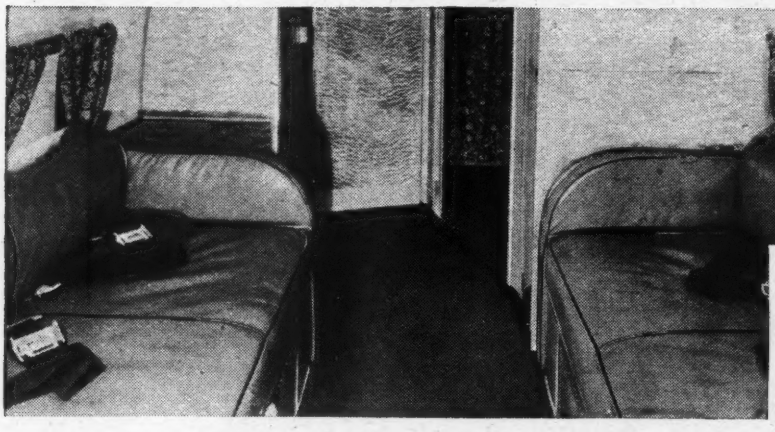

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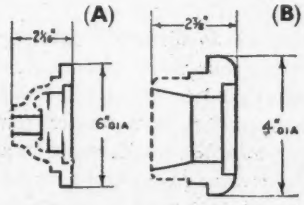

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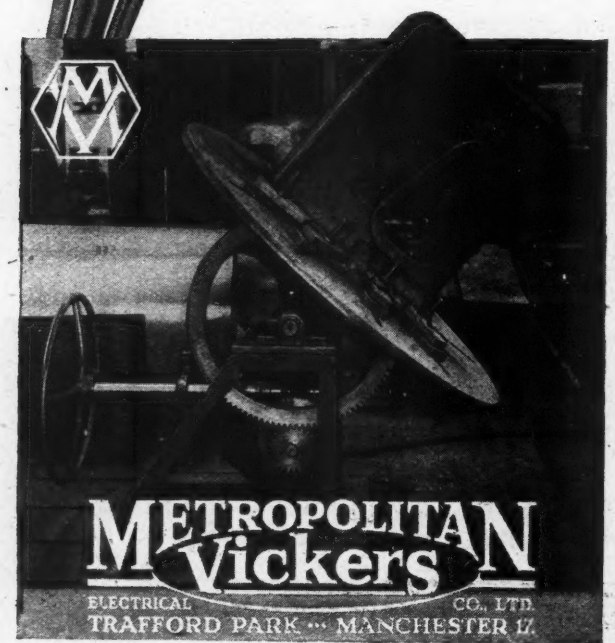

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Applicants should take a certified statement of character and educational level to any R.A.F. Recruiting Centre (former A.T.C. Cadets should also take their Progress and Confidential Reports), and volunteers judged suitable will be sent to an Aircrew Selection Centre for interview, flying aptitude, educational and medical tests.

Successful candidates will be engaged for five years' regular and four years' reserve service, a gratuity of £200 being paid on transfer to the Reserve to those not selected for short service commissions or for re-engagement to complete time for pension.

Short service commissions in the General Duties Branch will in future be granted only to aircrew enlisted under this scheme, and to airmen already serving on extended service, to a proportion of whom permanent commissions will be open later on.

Full details of the scheme including medical standards required are given in Air Ministry Pamphlet No 96, obtainable from any R.A.F. Recruiting Centre or from the Air Ministry, Dept. FLC2, Victory House, Kingsway, London, W.C.2. Apply without delay.

Royal Air Force

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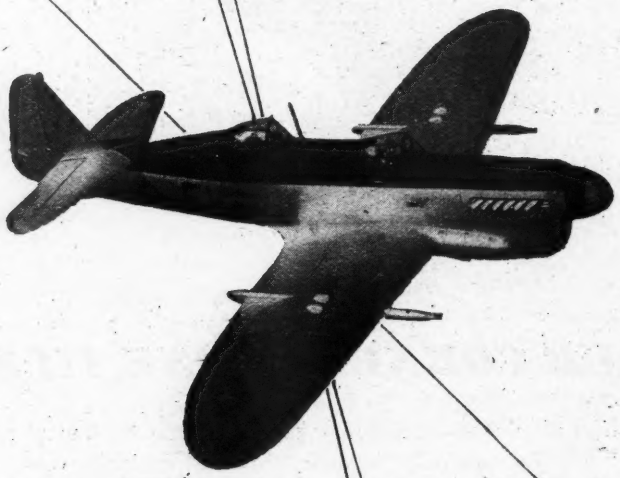

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No. 2044 Vol. LIII February 26th, 1948 Thursdays, One Shilling

The Outlook

Double, Double, Toil and Trouble

RECENTLY there has been more than the usual bubbling in that witches' cauldron which British Civil Aviation has become. Air Vice-Marshal Bennett's dismissal was the stick of wood which set the cauldron bubbling, and now it has every appearance of threatening to boil over and spilling its unsavoury brew.

At question time in the House of Commons on February 18th, allegations were made that in November last year a Tudor IV landed in Bermuda with not enough fuel to taxy off the runway. The Parliamentary Under-Secretary of the Ministry of Civil Aviation explained that the machine had met strong head-winds, of which the captain had not been adequately warned, and that in any case the dip-stick reading taken was wrong in that the aircraft was standing tail-down. There was at least 100 gallons left (B.S.A.A. confirmed this in an official statement). Mr. Lindgren expressed the view that incidents such as this had a bearing on the lack of confidence of the board of B.S.A.A. in its chief executive.

On the subject of the grounding of the Tudor IVs, Mr. Lindgren cleared the Minister of Civil Aviation of the accusation that he had taken this step on his own responsibility. Lord Nathan had obtained the opinion of the Air Registration Board, which was that it would be prudent to ground the aircraft. The disappearance of the Tudor IV on its way to Bermuda might have been due to a number of causes, one of which might have been the aircraft itself.

It was scarcely surprising that Members should take the opportunity to seek information concerning the relative accident rates of the three Corporations. Even without detailed statistics, it has been obvious for some time that the British South American Airways Corporation has been unfortunate in this respect. Mr. Lindgren's figures confirmed this impression. Both in the matter of fare-paying passengers and in aircraft fatalities, the Corporation comes off badly. Mr. Lindgren used somewhat unusual language (for Westminster) by saying that the operations of the Corporation "were very near the bone," and when called upon to explain what he meant by that he replied: "The inference has been made, with some justification, I think, that the training and maintenance standards were not as high as they should have been." The Corporation has denied this, although it admits that "the high accident rate has been causing us some concern."

Now all three nationalized Corporations have had their knuckles rapped. B.O.A.C. and B.E.A.C., for losing a lot of money, and B.S.A.A. for its high accident rate Altogether, it does not seem that the choice of civil aviation as the first experiment in nationalization has been an outstanding success. Even in the Ministry itself, all is not well. It might be said to be an Ariel House divided among itself. The Controller of Technical and Operational Services, Air Vice-Marshal Sir Conrad Collier has, in the words of the official announcement, "submitted his resignation to the Minister of Civil Aviation, who has accepted it." As no reason has been given for the resignation, and as there has been no attempt at any face-saving excuses, it may be taken that Sir Conrad finds himself in strong disagreement with the way things are going.

Small Aircraft Engines

ONE of the most serious bottlenecks in the field of low-powered flying in this country is the supply of suitable engines. Through the financial assistance given by the generosity of Lord Kemsley, the Ultra-Light Aircraft Association has been able to purchase at a fairly low cost a batch of 37 h.p. J.A.P. aircraft engines in new condition, but needing overhaul as a result of having been stored. This is now being done, and the Association is offering them to members on reasonable terms.

The U.L.A.A. is not, however, leaving the matter there. Taking a long view, and visualizing the time when low-powered flying can really get going on a large scale, it has drawn up specifications for two small engines. This has been done in consultation with interested aircraft and engine designers, and the specifications have been approved in principle by the Air Registration Board, to whose requirements for ultra-light aircraft the engines must conform.

Primary requirements for the designs are: reliability, cheapness, simplicity and ease of maintenance, and smoothness and quietness. First priority is given to an engine of some 50 h.p., to come within the two-litre class, but second choice is for a smaller unit of 25-30 h.p. in the one-litre capacity. Four-stroke operation is preferred, and the use of certain components common to both engines is suggested as a means of reducing cost.

Air-cooling is stipulated, and the Association expresses a preference for the four-cylinder horizontally opposed arrangement, with direct airscrew drive for cheapness. This limits the engine speed to some 3,000 r.p.m. in order to retain reasonable airscrew efficiency. If gearing is to be employed, the Association calls attention to the possibilities of mounting the airscrew on an extension of the camshaft.

With a view to reducing expense, the possibility of using well-proved standard car and motor cycle engine parts is encouraged by permitting a maximum weight of 3.5 lb/h.p. We are by no means convinced that this is a good move. The specifications stipulate that the engines must be capable of continuous cruising at 80 per cent of maximum power. It appears very unlikely that car or motor cycle components would give the necessary reliability under such conditions. But in general the action of the Ultra-Light Aircraft Association is to be applauded.

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Aeromodellers Threatened

DESIGNERS and builders of flying aircraft models are likely to be greatly handicapped, if not actually "grounded," by the stopping of supplies of balsa wood. From the fact that something like 300,000 models are built by model fliers annually it might be imagined that the sport absorbs large quantities. This is not, of course, the case. The amount of balsa used in a flying model is infinitesimal.

Many people have the idea that these models are mere "toys," and that the model fliers are just kids playing with them. Nothing could be further from the truth. Many of the models are designed on scientific principles, and model flying is the finest basis for making the nation air-minded. Her Majesty the Queen has recognized this by offering a cup, to be known as the Queen's Cup, for annual competition. It would be a pity if this splendid movement were ruined for the sake of a few hundredweight of balsa wood.

"Flight" photograph.

STAR LEOPARD: The fourth Avro Tudor IV for B.S.A.A. (and, incidentally, the first conversion of a Tudor I) on a contractor's check flight from Woodford. Small leading-edge root fillets—a recent improvement—remain to be fitted before delivery to the Corporation.

After joining formation in dirty weather, Harvards and Seafire 46s of No. 1832 R.N.V.R. Air Squadron fly past the visiting Admirals.

Culham Pilots Fly 900 Hours in Seven Months

Illustrated by "Flight" Photographs

TWO Admirals—Vice-Admiral Sir Wilfred Patterson, K.C.B., C.V.O., G.B.E., Admiral Commanding Reserves, and Vice-Admiral R. H. Portal, C.B., D.S.C., Flag Officer (Air) Home—visited H.M.S. *Hornbill*, the Royal Naval Air Station at Culham, near Oxford, on February 14th, to inspect and congratulate No. 1832 R.N.V.R. Air Squadron. Their congratulations were prompted mainly by the splendid flying record of the Squadron during the seven months it has been in operation. Since July 12th last year, when Lt. Cdr. (A) I. P. Godfrey, O.B.E., R.N.V.R., the Commanding Officer, and Lt. (A) K. Talbot, R.N., Senior Staff Officer and Chief Instructor, made the first sortie, in a Harvard, well over nine hundred hours' flying have been chalked up. The top scorer is Lt. (A) A. R. Michie, who, at the time of the Admirals' visit, had logged over sixty-six hours.

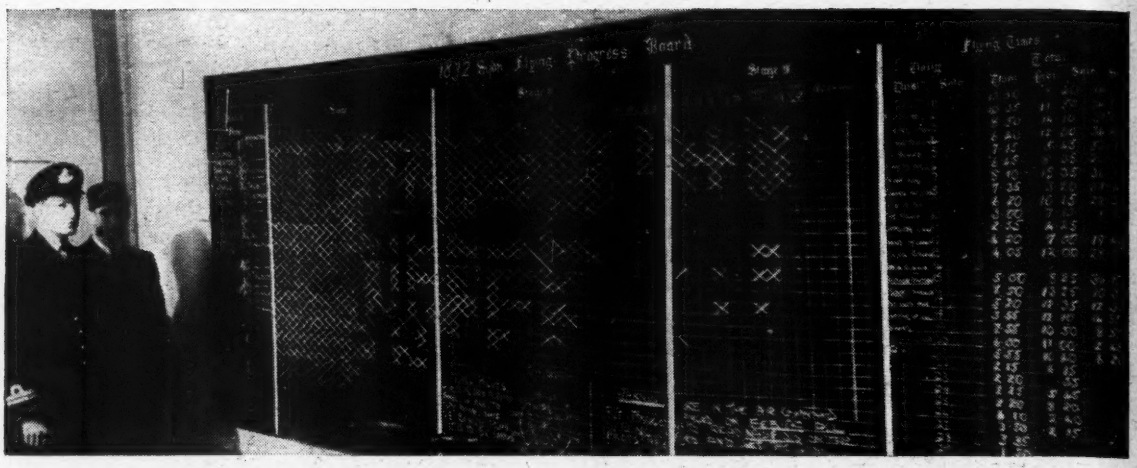
Formed in the early summer of 1946, No. 1832 Squadron was intended to attain an R.N.V.R. Officer complement of sixteen pilots. The eager response of volunteers from the London area has caused this to be increased to thirty-two, of which number twenty-nine have already received their appointments. As originally laid down, the equipment was six Seafire Mk. 46 Naval single-seat fighter reconnaissance aircraft and three Harvard trainers, but in conformity with the increased officer establishment, the Squadron now possesses, in addition to the half-dozen Seafire 46s, two Seafire XVIIs and six Harvards.

Vice-Admiral R. H. Portal, C.B., D.S.C., the Flag Officer (Air) Home, congratulates personnel of the squadron

Though the squadron is primarily a fighter unit, it was decided to recruit not only from ex-fighter pilots, but from those who had flown torpedo-bomber reconnaissance aircraft during the war. Conversion has proved most successful and the Chief Instructor has reported no difficulty in passing out on Seafire 46s pilots who had been used to flying the heavy Avengers and Barracudas. In the early days there was some apprehension that conversion straight from Harvards to the 450-m.p.h. Seafire 46s would be too great a step and a few Mark III Seafires were kept for intermediate flying training. Experience, however, proved these to be unnecessary and they have been withdrawn.

Eighty per cent of the pilots have had considerable operational experience. They have been recruited from a wide area and from a variety of civilian occupations. Nine of them (the younger and less experienced) are students, and aircraft operating concerns are strongly represented. Such is the keenness that, although officers are expected to report for training on only two week-ends a month, attendance is, in fact, of the order of two long week-ends and one short week-end in every four. Even in the long summer evenings, little flying is done during the week, most of the pilots finding it impossible to get to Culham from their work or studies. One or two, however, have managed a continuous week or more of training during their holiday or University vacation.

Of the 900-odd hours com-



Since July 12th, 1947, Seafires and Harvards of No. 1832 squadron have completed over 900 hours in the air, all duly recorded on this board. The figure does not include flying by instructors alone.

R.N.V.R. Air Squadron . . . . .

pleted to date, rather more than half has been put in on the Seafires. After dual instruction and solo flying in Harvards, new pilots are given blind-flying experience, either with instructors, or with fellow-officers acting as safety pilots. Homing and QGH procedure are practised, in addition to formation flying, cross-countries, "oxygen climbs" and tactical exercises.

In his address to personnel of the Squadron, Admiral Portal praised the work of the fifty permanent maintenance ratings who, under Lt. (A) T. M. Chapman, R.N., and Chief Petty Officers Johnson and Swallow, have maintained a high rate of serviceability, taking their "week-end" leave during the week. Vice-Admiral Portal, who was received at Culham by Captain H. F. Layman, D.S.O., R.N., the Commanding Officer of the Station, also announced that the summer Armament Camp will be at Culdrose, during June and early July. So that full utilization may be made of the available aircraft, the training programme will be divided into two periods of a fortnight each, with a break to allow the maintenance crews to get the machines fully serviceable for the second "watch." Each pilot should be able to get in about twenty hours' flying and will have an opportunity of firing at various types of target with the four 20 mm guns with which the Seafire 46 is armed.

The Culham squadron is the only R.N.V.R. unit to be equipped with the Mark 46 Seafire. Apart from lacking power-folding wings, this variant differs little from the Mk 47 and can be considered as a Naval version of the Spitfire 22. Though deck-arrester gear is fitted and provision is made for rocket-assisted take-off, it is not intended at present that 1832 Squadron should practise carrier flying. Modern as its equipment is, the Squadron is likely to be re-armed with the Hawker Sea Fury fighter-bomber, with Bristol Centaurus engine. The Sea Fury may also equip other R.N.V.R. units.

Notwithstanding the excellent recruiting results and the mounting flying hours of the R.N.V.R. Air Squadrons, these units have hitherto received little publicity and for this reason an outline of their composition and conditions of service is in order. Four are now in being. Apart from the fighter squadron at Culham, there is a fighter/anti-submarine unit at Abbotsinch, near Glasgow, a fighter squadron at Stretton, near Liverpool, and another based at the former Transport Command airfield at Bramcote, near Nuneaton. The squadrons are commanded by R.N.V.R. (A) officers and, though they have liaison with the existing R.N.V.R. divisions, they are independent commands.

Conditions of Service

For the present, enrolment in the R.N.V.R. Squadrons is restricted to pilot and observer officers between the ages of twenty and thirty, who have had front-line squadron flying experience with the Royal Navy. A small number of air engineer officers are accepted up to the age of thirty-five. Pilots and observers are eligible to enrol for an initial period of five years, which may be extended subject to certain stipulations. Air engineer officers are not required to enrol for any specified period. Pilot and observer officers must carry out annually fourteen days' training, either ashore or afloat; twelve week-ends; and a further 100 hours' non-continuous training. They are

Starting-up the Griffon engines of the Seafire 46s preparatory to the fly-past. The airscrews are contra-rotating Rotols.

While the Seafires are refuelled, the C.O. convenes an informal gathering. The maintenance ratings, seen on the job, are Regulars. Recruiting of R.N.V.R. maintenance personnel is now under consideration.

Accompanied by Lt. Cdr. (A) I. P. Godfrey, Commanding Officer of No. 1832 Squadron, Vice-Admiral Sir Wilfred Patterson inspects R.N.V.R. pilots.

eligible for a bounty of £35 per annum and during continuous training are entitled to Naval pay and allowances.

Tribute having been paid to the R.N.V.R. Air personnel, a final word must be said in praise of the wives who accompany their menfolk to their stations over week-ends and occupy themselves as best they can. Plans are in hand at Culham for improving the amenities for these most welcome and patient visitors. Counter-attractions to a grand-stand view of the flying by Seafires and Harvards will be a squash court and croquet lawn.

NEW U.S. JET

IN the February 5th issue of *Flight*, we gave first details of a new American jet unit designated JHARL 6000-XA, which is projected by John Hawkins and Associates, of North Hollywood, California.

We have just learned from this concern that preliminary development work for the large unit is now being undertaken with a miniature 300 lb thrust version.

Although no running of the 6000-XA is expected yet awhile, the chief engineer of the project states that, despite the current rating of 6,600 lb static thrust, the engine will, in fact, exceed a delivery of 8,000 lb. He also gives percentage comparisons for the unit relative to the General Electric TG-180 and I-40. The percentages are as follows: with equal range, a load increase of 73 per cent; with equal load and fuel, a range increase of 90 per cent; and with equal load and range, a fuel saving of 48 per cent.

By the exercise of some restraint, and in view of the desirability of keeping Anglo-American relations harmonious, we confine comment on these figures to the observation that, if nothing else, they infer an optimistic faith in the project.

The further estimate that the engine life will be 500 hours, which is quoted as being two to three times longer than any jet engine now in existence, would seem to be a misprint for overhaul period. In this connection, it is worthy of note that the R.A.F. overhaul period for the Rolls-Royce Derwent I is 300 hours, and if we point out that the Derwent has behind it many, many thousands of hours' running experience, we feel it will be sufficient to put the whole matter in perspective.

Another misprint was responsible for our quoting the weight of the JHARL 6000-XA as 1,200 lb. This should have been 2,100 lb.

Strategic Bomber Offensive

Sir Norman Bottomley Discusses Features of European Campaign Before R.U.S.I.

DAY bombing compared with night bombing; area bombing *versus* precision bombing; the choice of target systems; the extent to which strategic bombers were able to support the armies and navies; control of the strategic air forces at various stages; the difficulty of maintaining strategic aims in the face of all defensive claims; the expenditure of effort and achievement; and, finally, the lessons learnt—all these questions were dealt with by Air Marshal Sir Norman H. Bottomley, K.C.B., C.I.E., D.S.O., A.F.C., in a lecture before the R.U.S.I. last Wednesday week.

Of the points made by the Air Marshal, one of the most significant was that, of the tonnage of bombs dropped by the Allied Air Forces in Europe in six years of war, half was put down in the last year after D-Day, and of the tonnage dropped on Germany itself, three-quarters was dropped after D-Day. This, he pointed out, gave some idea of the short period during which the bomber offensive was delivering a really effective weight of effort.

Early Limitations

Concerning day bombing, he said that this was impracticable in the R.A.F. during the early part of the war because of the inferior performance and armament of our bombers as compared with enemy fighters, and because of our lack of long-range escort fighters. It was impossible to convert our fighters for long-range work and our resources did not allow production of two classes of fighter.

The question arose as to whether our heavy scale of attack against industrial areas was justified at the time. There was, said the Air Marshal, no question that these attacks had a considerable effect on the Germans' war effort, but recent investigations had shown that the effect in itself was never critical. In the first place, the forces available in Bomber Command were inadequate, especially in view of the calls which were made on them at a later date for the support of the Invasion. In the second place, contrary to general belief at the time, German war production was never really stretched until late in the war. Up to that time, there was always some slack in the economic machine and the enemy was able to call on this in the emergencies. The question of area bombing as opposed to the attack of precise targets or target systems would prove, said the Air Marshal, a most interesting question when studied in relation to new forms of warfare.

It was difficult to assess the real value of direct support by heavy bombers—such as was given by Bomber Command at Caen or by the U.S. Eighth Air Force at St. Lo-Perrier. Generally speaking, examination of the ground immediately after an advance failed to show that such attacks had succeeded in destroying large numbers of personnel, guns or armour. Moreover, in many cases, heavy bombardment of up to ten tons per acre resulted in such cratering and demolition that the advance of our leading ground formations, and particularly tanks, was seriously hindered. The use of fragmentation bombs, had these been available in sufficient quantity, would have avoided that disadvantage.

Measured in terms of ultimate results achieved, the two most important target systems which were systematically attacked were oil and transportation. A recent lecture by Lord Tedder was quoted The C.A.S. had said that these two factors were "the one common denominator of Germany's war effort—from the political control at the top down to the supply of the troops in the front line."

Air-Sea War

Air Marshal Bottomley was afraid that he might be under fire from the Navy if he failed to mention something about the use of the Strategic Air Forces in support of the war at sea. The greatest menace which faced us at sea was that of U-boats. Criticism has been made that the Strategic Air Forces had not played a sufficient role in countering this menace. He thought this criticism was ill-founded; indeed, some hundred thousand tons of bombs were dropped—the bulk of them in area attacks—on targets connected with the construction of U-boats Examination after the war had shown that it was the offensive against transportation which ultimately brought the U-boat industry to a standstill. Of nineteen new squadrons formed in Bomber Command in 1942, thirteen were transferred either to Coastal Command to help in the Battle of the Atlantic, or to the Mediterranean or Indian theatres to co-operate with the armies.

The main contribution made by the Strategic Air Forces to the conduct of sea warfare was the mine-laying campaign by Bomber Command. During the war, the Command laid 47,000 mines, which were responsible for sinking or damaging over nine hundred enemy ships, and the Command was, in fact, responsible for over 30 per cent of sinkings inflicted on enemy shipping in the north-western waters. This was additional to their attacks on the German main Naval units, of which ten, including the *Tirpitz*, *Lützow*, and *Scheer* were sunk.

Great pressure was brought to bear on the Air Staff to counter the V-1 and V-2 attacks by heavy bombing raids on the sites and objectives connected with development and production. About 100,000 tons of bombs were dropped in a thirteen-month campaign, representing nine per cent of the total tonnage dropped by the Allied Air Forces during that period. "The most we can say for our defensive bombing attacks," said the Air Marshal, "is that they forced the Germans into a large amount of repair and construction of V-1 sites and they probably delayed the beginning of launching by three or four months. In the case of the V-2 offensive, they neither delayed it nor reduced it to any extent." He went on to point out that the campaign clearly showed how difficult it was to avoid demands for diversions from a planned and agreed military aim where public morale was so seriously affected and where there was available such a flexible force as a heavy bombing force.

Importance of Intelligence

Quite outside the question as to whether we were right in choosing certain target systems as our main objectives, or whether we ought to have attacked these systems at an earlier or different phase of the war, one of the outstanding lessons appeared to be the need for a first-class comprehensive intelligence organization on which to base our strategic decisions in the future. In the last war, the most important shortcomings of our intelligence system was in respect of economic, industrial and social intelligence of our enemy The machinery which existed between the military and other Government Departments and certain individual authorities which were capable of giving first-class advice was not really satisfactory. We had not utilized to the full the wealth of specialist technical knowledge we had—certainly not in the early stages. This was a matter which needed most careful and periodic review in order to meet changing conditions of the future. Another direction in which we suffered was in the scientific field. In the early and even the middle stages of the war, we lacked scientific advice, scientific guidance and scientific inspiration. Of the three Services, the Air Marshal thought the R.A.F. was the first to recognize this weakness, and once it was recognized, rapid progress was made.

Finally, if there was one outstanding lesson to be learnt from the last war, Air Marshal Bottomley thought, it was that a strong and well-equipped strategic air force remained a primary need for the British Commonwealth of Nations. It was the essence of peace and of our future defence, and it was to the advantage of our people, and the Navy, Army and Air Force alike, that we should maintain this force at the highest possible standard of readiness.

HELICOPTER LECTURE

MEMBERS and friends of the Helicopter Association of Great Britain are reminded that on Saturday next, February 28th, Mr. Raoul Hafner will describe the Bristol 171. As the designer of the machine, he will probably add something to the details given in our description in *Flight* of October 30th, 1947. As usual, the meeting will be held at Manson House, 26, Portland Place, London, W.1, starting at 2.30 p.m

CIVIL AVIATION NEWS

UNDER THE TRICOLOUR : An Airspeed Consul, belonging to the Societé Indochinoise de Transports Aeriens, in company with an Air France Skymaster and a French military Ju 52 on the tarmac of Tan Son Nhut airfield, Saigon.

The Dipstick Story : Grounding of Tudor IV a Precaution : Accident Records : The Atlantic Weather Ships

In Parliament

GENERAL uneasiness about British civil aviation marked question time in the House of Commons on February 18th. On the subject of the dismissal of Air Vice-Marshal Bennett, Mr. Lindgren repeated the statement made some days previously by Lord Nathan in "another place." The only new information given was that Air Vice-Marshal Bennett has ceased to be a member of the board of B.S.A.A. "He failed to resign, and therefore my noble friend declared the position vacant."

Mr. George Ward asked whether the Parliamentary Secretary was aware that a Tudor IV of B.S.A.A. recently landed at Bermuda with insufficient petrol to enable the aircraft to be taxied off the runway. Mr. Lindgren replied that the Governor of Bermuda telegraphed that on November 14th Tudor IV G-AHNK landed with insufficient fuel safely to complete a circuit of the airfield. Inquiries showed that the machine had met abnormally strong headwinds, of which the captain had received no adequate warning. B.S.A.A. had stated that the dipstick gave a misleading reading because the aircraft was in a tail-down position; in fact, at least 100 gallons remained.

In reply to another question Mr. Lindgren said he thought incidents such as this had a bearing on the lack of confidence of the board in their chief executive. Other questions disclosed that this was the only instance of an aircraft landing at Bermuda actually short of petrol. There had been two cases of the Air/Sea Rescue Service in Bermuda being alerted: one was shortage of petrol and the other an engine failure.

Mr. Ivor Thomas asked his successor about the grounding of the Tudor IV aircraft, and was told that the Minister of Civil Aviation had made the decision following a report from the A.R.B., which advised that it would be prudent to ground the aircraft.

Questions by Major Vernon and Mr. George Ward elicited the information that the accidents statistics for the three Corporations showed that for the 18 months up to January 31st, 1948, B.O.A.C. had flown some 432 million passenger-miles, B.E.A.C. 127 million, and B.S.A.A.C. 66 million. The numbers of fatal accidents to fare-paying passengers per million passenger-miles flown had been 0.025, nil, and 0.88 respectively. The numbers of aircraft accidents involving fatalities during the same period per million miles flown were 0.09, 0.07 and 0.66 respectively.

Mr. Ward asked to what Mr. Lindgren attributed the fact that the accident rate of B.S.A.A.C. did not compare favourably with those of the other two Corporations. Mr. Lindgren replied: "I do not think that the high accident rate is unrelated to the fact that the operations of the Corporation are very near to the bone. Mr. Lennox-Boyd asked what was meant by "near to the bone," and Mr. Lindgren replied: "The inference has been made, with some justification I think, that training and maintenance standards were not so high as they should have been."

AER LINGUS

QUESTIONS were asked by Air Commodore Harvey as to what extent the British European Airways Corporation had been consulted by the Irish Air Line, Aer Lingus, regarding their decision to dispose of seven Vickers Viking aircraft. The reply was that the decision was made by the board of Aer Lingus, on which the B.E.A.C. is represented. Air Commodore Harvey thought the arrangement with Aer Lingus most unsatisfactory. The British had a financial interest, and the decision made had caused great harm to the British aircraft industry. The British side of the board should have more to say in what was to happen. To this Mr. Lindgren replied that they do have quite a lot to say, but it was votes that counted. To another question Mr. Lindgren replied that B.E.A.C. holds ten per cent of the shares in the Irish air line, and that the loss on current operations payable by the English corporation is approximately 12½ per cent.

THE MAINTENANCE BASE

TRANSFER of the B.O.A.C. Maintenance Base from Montreal to Filton was the subject of a question by Mr. Geoffrey Cooper, who wanted to know what was the target date. Mr. Lindgren replied that it was hoped to complete the transfer before the end of 1948. Mr. Cooper further stated that for two years he had been making representations to the Department that this transfer should take place, and that had notice been taken we should have saved many hundreds of

thousands of dollars. He alleged that at present delays are taking place due to protracted negotiations between B.O.A.C. and the Ministry of Civil Aviation. Mr. Lindgren, in reply, said there was a happy co-operation between the Ministry of Civil Aviation, the Ministry of Works, the Bristol Aeroplane Company, and the Ministry of Supply. The delay was really due to the fact that the American aircraft manufacturers of the Stratocruisers are not keeping up to their delivery dates.

WEATHER SHIPS

ANOTHER question, asked by Air Commodore Harvey, was which countries had agreed to operate weather ships in the North Atlantic, and to what extent they had fulfilled their obligations. Mr. Lindgren stated that there are 13 stations to be operated, seven of which are already opened. We had completed our part. The Americans had to do more, but they undertook greater obligations than we did. The list of stations was as follows:—

Country	No. of Stations to be operated‡	No. of Stations in operation‡
United States	7	2
United States and Canada jointly... ...	1	1*
United Kingdom	2	2
Belgium and Netherlands jointly	1	1
France	1	1
United Kingdom, Norway and Sweden jointly	1	—†

* On half-time service.
† Due to come into service in March-April, 1948.
‡ Each station requires two ships to maintain a continuous service.

B.E.A. REDUNDANCY

CONSULTATIONS are in progress between B.E.A. and the British Airline Pilots' Association regarding the question of redundancy of air crews. The number of pilots and radio operators likely to become redundant are 71 and 17 respectively. B.E.A. state that this surplus of air crew has come about because of the decreased traffic resulting from the ban imposed on foreign holiday travel; considerations of economy have also influenced the decision on the reduction of staff which began last September.

Under the reorganization scheme of B.E.A., reported in *Flight*, February 5th, three senior officials of B.E.A. have been notified that their services may no longer be required; these are: Captain E. E. Fresson, chief of the North-Eastern Region; Mr. W. Cumming, deputy manager of the Scottish Division; and Captain D. Barclay, a senior pilot.

LATÉCOÈRE 631 LOST

A LATÉCOÈRE 631 six-engined flying boat crashed into the sea off the Normandy coast on Saturday, February 21st. Nineteen persons were on board at the time, including a crew of seven and seven observers from the French Air Ministry. M. Gourju, the managing director of the Société de Constructions Aéronautiques du Nord, the company which built the aircraft, and other officials of the company who were aboard are also among the missing. It is reported that the aircraft, piloted by a French test pilot, M. Creton, took off from Le Havre in good weather, but encountered a snowstorm near Cherbourg, where it was last seen; it is believed that no de-icing equipment was fitted. Bad conditions at sea in the neighbourhood of the accident prevented any rescue attempts being made by local fishermen. So far two bodies and a quantity of wreckage have been recovered from the sea near St. Marcouf, on the Cherbourg peninsula.

E.A.N.S. POLAR FLIGHT

FIVE out of the seven R.A.F. Lancasters from the Empire Air Navigation School at Shawbury landed at Kinloss on their way back to Shawbury after completing a navigational exercise which took in Gibraltar and Bear Island (in the Arctic), and a stop was made at Reykjavik in Iceland. The two other machines withdrew from the last section of the exercise, one being delayed at Reykjavik by a defect in the electrical and radio apparatus, and the other which had reported an oil leak in one of the engines; these machines proceeded independently and returned safely. The purpose of the flight was to gain further experience with methods of polar navigation, initiated by the crew of the Lancastrian *Aries*, which flew to the North Pole in May, 1945. By taking continuous advantage of favourable winds a distance of 2,200 miles, which would normally have occupied 11 hours, was completed in 10½. This exercise forms the passing-out test of the post-graduate specialist navigators' course of the E.A.N.S.

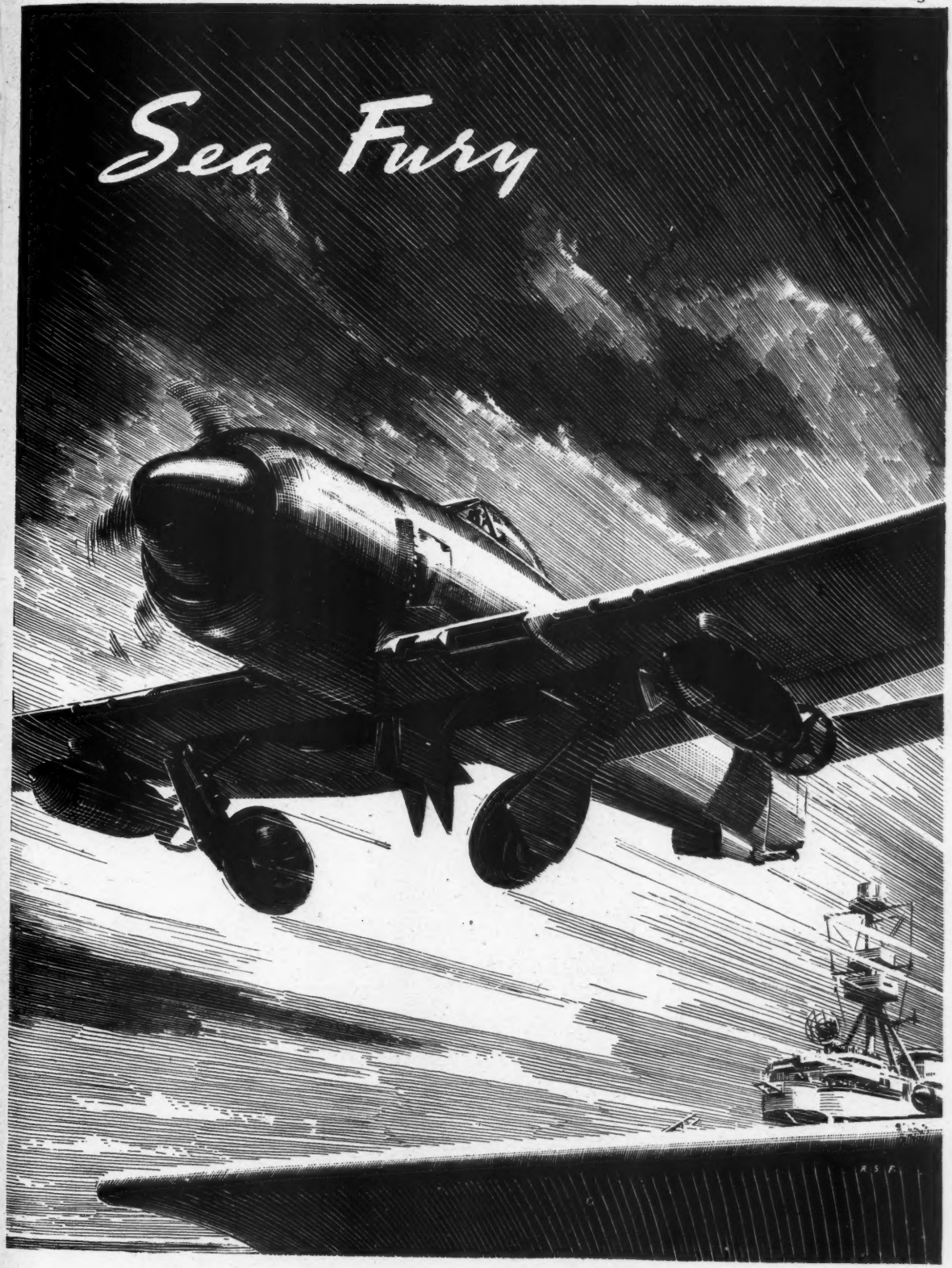
LUXEMBURG PROGRESS

THE newly formed Luxemburg Airlines Company, referred to in *Flight*, January 22nd, is making good progress and at the moment is using Dakotas converted by Scottish Aviation, Limited, Prestwick, for their thrice-weekly services to Paris and Zurich. The first air-mail service between Luxemburg and Frankfurt opened on February 13th. Members of the Scottish Airlines Company are training Luxemburg stewardesses and traffic and office personnel in their duties. The managing director of Luxemburg Airlines is Captain M. R. Lacy, who has been with Scottish Airlines since leaving the R.A.F. in September, 1946. During the war he served with Coastal and Transport Commands, and for eighteen months was pilot to the Resident Minister in West Africa, Viscount Swinton.

NOTICES TO AIRMEN

THE Ministry of Civil Aviation has issued a number of *Notices to Airmen* which concern matters of navigation of aircraft in the United Kingdom. *Notice No.* 54 refers to interference with S.B.A. reception in the London area by the television sound programme radiated from Alexandra Palace on 41.5 Mc/s. Pilots and radio operators are warned that it may be unsafe to navigate aircraft in accordance with S.B.A. signals unless such signals are very strong compared with the interfering television signals. *Notice No.* 55 gives details of the length of messages tendered for transmission over the U.K. Fixed Telecommunication Service. Referring to the Northern Scottish Flight Information Region *Notice No.* 57 directs that civil aircraft equipped with radio and flying in this area should establish and maintain communication with Area Control, Inverness (call sign MZG) until instructed to change to the frequency of approach Control and Aerodrome Control at their destination. Requests for D/F positions should be made to Kirkwall, and for D/F bearings to Northern Scottish Flight Information Region D/F Stations. Details are also given of alteration in frequencies and hours of service of navigational assistance in various areas. I.C.A.O. communications, codes

FLOWERS BY AIR: Consignments of flowers arriving from the Scilly Isles, at Penzance, for distribution to London and the Midlands by train. The growers plan to increase air shipments to 1,500 boxes a day, since the cost works out at only ¾d. a bunch more than by sea transport.

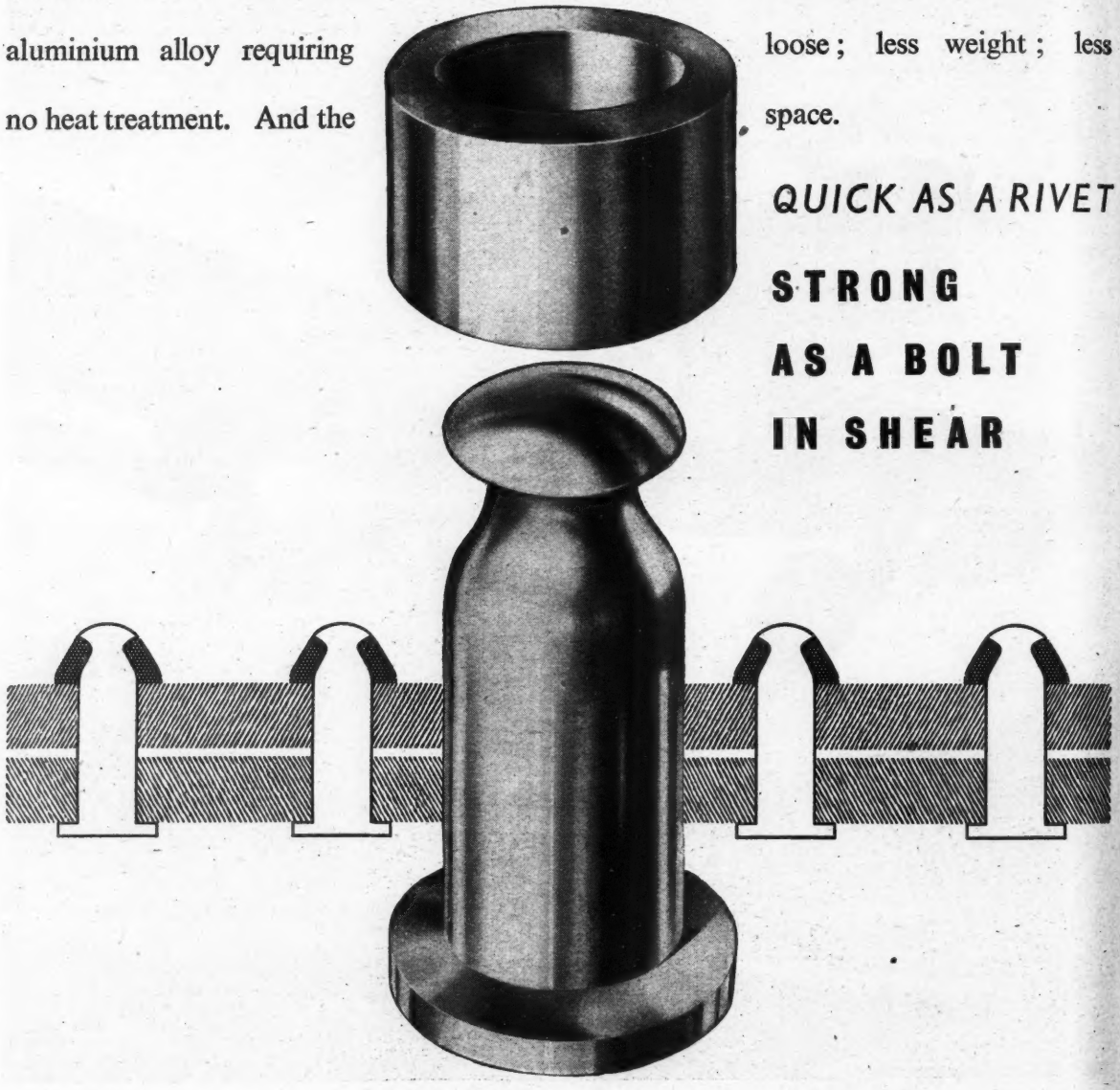


HAWKER AIRCRAFT

(Branch of Hawker Siddeley Aircraft Co. Ltd.)

Hi • Shear
STOP PIN

The body of a Hi-Shear Stop Pin is made from alloy steel of 55 tons per sq. in. minimum tensile strength. But the collar is malleable and made from an anodised aluminium alloy requiring no heat treatment. And the operation is as quick and simple as riveting. In three seconds the collar is swaged to the pin and you're slipping the next Hi-Shear Pin into position. Hi-Shear cannot work loose; less weight; less space.



QUICK AS A RIVET

STRONG AS A BOLT IN SHEAR

Send for descriptive leaflet . . .

SIMMONDS AEROCESSORIES LIMITED. TREFOREST, GLAMORGAN

Civil Aviation News . . . . .

and abbreviations are given in *Notice No.* 58.

Information is given in *Notice No.* 59 that the S.C.S.51 main beacon at Prestwick will be taken off service at 0800 hours G.M.T. on February 23rd for approximately three days for modification. Details of mountain warning lights are contained in *Notice No.* 61.

PRIVATE EXCHANGE

WITH the purpose of establishing an air movements centre for charter aircraft, First Air Trading Company Limited started last July, and have in a short space of time become well established. The prime function of the company is to act as an air charter clearance centre receiving notification of the space for both passengers and freight available on chartered aircraft and recording it in order to keep the travel agents well informed. Contact is made solely with travel agents, and the company arranges charters with suitable operators and with suitable aircraft from those available.

"Flight" photograph.

BOVINGDON DEVELOPMENT: *The Buildings at Bovingdon which are now being fitted out for the handling of passengers and freight using this airfield. Facilities include provisions for passport, customs, ticket checks, weighing of baggage and other formalities connected with air travel.*

K.L.M.'s EASTERN ROUTES

CHANGES in the schedule of their Amsterdam to Batavia service are announced by K.L.M. In future Constellations on this route will make a night stop at Cairo, instead of Rome, and once a week, on both east and westbound flights a landing will be made at Singapore. The agreement between K.L.M. and the authorities at Singapore Airport permits two Constellation landings a week to be made there. Skymaster aircraft on this service will continue to make a night stop at Rome and will call at Lydda instead of Cairo. These aircraft will also continue their scheduled calls at Singapore.

CRASH AT SYWELL

IN his report on a fatal accident to an Auster last June, the Chief Inspector gave his opinion that it was caused by an error of judgment on the part of the pilot who failed to allow sufficient height for recovery after a low aerobatic manœuvre. He added that the pilot flew the aircraft in a manner dangerous to himself, his passenger and to people on the ground. Soon after leaving the ground at Sywell airfield the aircraft did a climbing turn to the left rising to about 100 feet. It then made a shallow dive towards the clubhouse in front of which some members were sitting on a low wall and as the machine approached a number of these jumped off the wall in alarm. The aircraft just cleared the roof of the building and climbed to about 150 feet, after which it stall-turned to the left and, before fully recovering from the resulting dive, struck the ground a glancing blow, bounced through a hedge and stalled down from about 50 feet.

LIMPSFIELD FATALITY

AN Airspeed Consul flying from Le Bourget to Croydon on April 29th, 1947, crashed into a wood on Botley Hill, near Limpsfield, Surrey, killing both the occupants, the pilot Mr. R. A. Milburn and the radio operator Mr. J. M. Hale, instantly. The weather was bad at the time of the accident, the high ground being intermittently obscured by cloud, and the daylight was failing. The log book of the radio operator was found in the wreckage and was kept in a confused manner, indicating a lack of experience as an air operator though he had had over four years as a ground operator in the R.A.F. There was no evidence to show that the pilot, although his "B" licence was valid and endorsed for Consul aircraft, possessed recent experience of approaching an airfield in adverse weather by the aid of radio. The accident was due, states the Chief Inspector of Accidents, to an error of navigation on the part of the pilot in failing to maintain sufficient height in low cloud.

IN MIXED COMPANY: *A Halton Air Explorer, believed to be the first British commercial aircraft to land at Budaörs airport, Budapest, since the war, in company with a Dakota of the Polish company L.O.T. and a Dakota of the Soviet company Aeroflot. The Halton's cargo, six tons of plastic cloth, is in the foreground.*

I.A.T.A. CERTIFICATES

AS a part of an extensive campaign to achieve uniformity and efficiency in booking passengers and cargo space, I.A.T.A. have announced the certification of agencies handling reservations. Certificates attesting that these agents have met standards which qualify them to do business with any of the 68 member companies are now being issued from the headquarters of the I.A.T.A. Traffic Conference No. 1 in New York. Out of a total of 1,946 certificates sent to agencies in North America, 1,450 related to sale of passenger traffic accommodation, 160 were for cargo space, and 136 covered the sale of both. These certificates indicate that the agent concerned has satisfied a board acting on behalf of all the airlines in the Conference as to his business *bona fides* and his capacity to render service to the airline and the public. Agents holding this authorization are eligible to sign the standard I.A.T.A. agency agreement with any member company and to receive the standard com-

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mission rate of 7½ per cent on passenger and 5 per cent on cargo. The uniformity in traffic matters achieved by the first meetings of the world traffic conference at Rio de Janeiro last October will bring benefit to the agents as, no matter where their business is transacted, equal treatment and co-operation will be received from all airlines and, however complicated, the amount of paper work involved in the bookings will be simplified.

Pan American Airways have announced that in order to adhere to the cargo agency resolution of I.A.T.A. governing the rates of commission for the sale of regularly scheduled air cargo transport they will with regret cancel their air cargo agreement with Railway Express Agency since, after prolonged negotiation, they and other international air carriers have been unable to execute new contracts with R.E.A. which conform to the I.A.T.A. resolution. In future they will deal directly with the shippers themselves and with qualified sales agents. There are more than 150 such agents in America.

BREVITIES

DURING 1947 D.N.L., the Norwegian airline, carried 100,000 passengers, 1,272,881lb of mail and 1,357,495lb of freight. The total number of kilometres flown was 5,341,000.

* * *

Mr. F. B. Collins, vice-president of Boeings, has announced that the first deliveries of Boeing Stratocruisers to B.O.A.C. will be made in the autumn, probably in October or November.

* * *

A conference of 13 major airlines in the Pacific will be convened by I.A.T.A. in Sydney on March 1st. Airline companies attending will include B.O.A.C., Pan-American, T.W.A., K.L.M., Qantas and Tasman Airways.

* * *

Mr. Whitney Straight, Chief Executive of B.O.A.C., has flown to Paris to meet representatives of Air France and discuss the creation of better relations between British and foreign airlines. It is expected that he will proceed to Amsterdam for similar discussions with Dutch airline officials.

* * *

United Air Lines and the Air Lines Pilots' Association have signed a new agreement embodying substantial wage increases for 1,000 U.A.L. pilots. Under this agreement a senior officer flying 80 hours a month, half by day and half by night, will receive from £227 a month for Dakotas to £316 10s for DC-6s in over-water operations, while for inland flights on the latter type the rate is £296 10s per month. The pay of co-pilots and reserve pilots has also been increased.

* * *

Air France and Sabena, the Belgian airline, are planning all-cargo flights across the Atlantic. Beginning during March, regular weekly flights between New York and Brussels will be made by Sabena, and Air France expects to introduce all-cargo aircraft on the transatlantic route in the summer, when passenger traffic increases and reduces the cargo that can be carried in airliners.

An air fare war has broken out between Mercury Airways, one of the bigger private companies serving the London-Johannesburg route, and South African Airways and B.O.A.C. Mercury Airways are now charging £220 for the return fare from Johannesburg to Britain compared with B.O.A.C.-South African Airways fare of £301.

* * *

Up to January 15th seventy-one flights had been made by Australian National Airways on the Vancouver-Sydney route, on which service 4,175 passengers were carried. On the New Zealand service, which commenced operations in April last year, nineteen flights were completed and 821 passengers were handled. All flights, with one exception, were completed to schedule.

* * *

In a review of their West Indian Division, K.L.M. announce that both passenger and freight traffic in that area have increased during the past year by over 50 per cent compared with the previous year. The total number of passengers carried had risen from 50,200 to 76,500 and the weight of mail, freight and excess baggage from 745 tons to 1,454 tons. During 1947 the West Indies network was extended to include San Jose (Costa Rica) and Havana (Cuba) and, at December 31, totalled 6,000 route miles.

* * *

Repercussions of the dispute between B.O.A.C. and A. V. Roe are reflected in the prolonged postponement in the production of Tudor aircraft by the Australian Division of Aircraft Production. The original intention was to build twelve Tudors, commencing at the end of 1946, but so far there has been no progress beyond the mock-up stage. It is understood that present indications are that only one Tudor II will be constructed, as an ambulance aircraft, mainly with the object of providing valuable experience. Lincoln bombers are still being built at the rate of one per month.

FROM THE CLUBS

MEMBERS of the Strathtay Aero Club, despite bad flying weather in January, completed about 40 hours' flying, three "A" licence tests being carried out. Two new members, Mr. F. B. Simpson and Mr. J. F. Grant, joined the club, which is still extending intermittent hospitality to members of the Scottish Flying Club, which has not yet found a permanent home.

* * *

Since their opening last August the Darlington and District Aero Club have flown a total of 500 hours and 12 "A" licences have been obtained by members; eight renewals have been granted. The club has been running dances each fortnight and a series of lectures given by Mr. W. L. Dewsnap, the chief instructor, and Mr. F. K. McIntyre, the manager, have been very well attended. Four Magisters and two Autocrats comprise the fleet and there are a number of privately owned machines, including a Moth Minor, Avro Tutor, Proctor, Dominies and Magisters; club membership now totals 200.

Since receiving the Darlington Club's notes, *Flight* has learnt with regret of the death of Mr. F. M. McIntyre in a crash near Croft aerodrome on February 15th. John Pattinson, a young member who was in the machine at the time of the accident, received only minor head injuries and after hospital treatment was able to go home.

* * *

With the object of giving young people between the ages of 13 and 17 the opportunity of taking an active and practical part in civil aviation, the Gloucester Flying Club has planned a scheme for opening a junior section. This will enable members to undertake their ground and air instruction so that they are ready to take their "A" licence when they attain the age of 17 years. A system of banking weekly payments is to be introduced to enable these members to spread the cost of their flying over a longer period. As series of ground instructional classes, to be held weekly, will cover a wide variety of aeronautical subjects; all junior members will be allowed to take part in the flying activities during evenings and weekends. Those interested should address their enquiries to the Secretary, Gloucester Flying Club, Staverton Aerodrome, Bamfurlong Lane, Cheltenham, Glos.

"Nice weather for flying boats"

CHIPMUNK

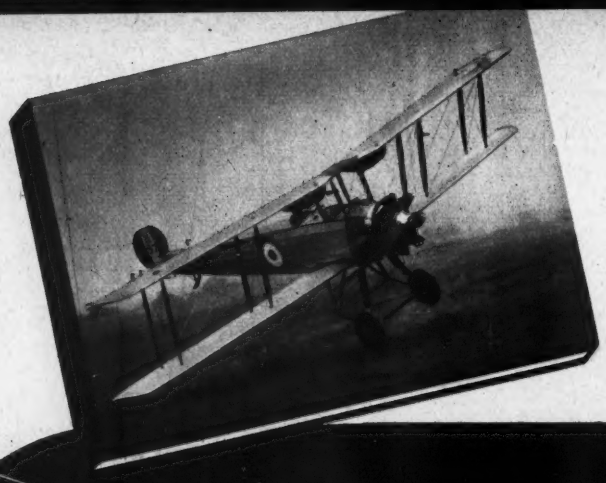
The

DE HAVILLAND

basic trainer

D H AIRCRAFT

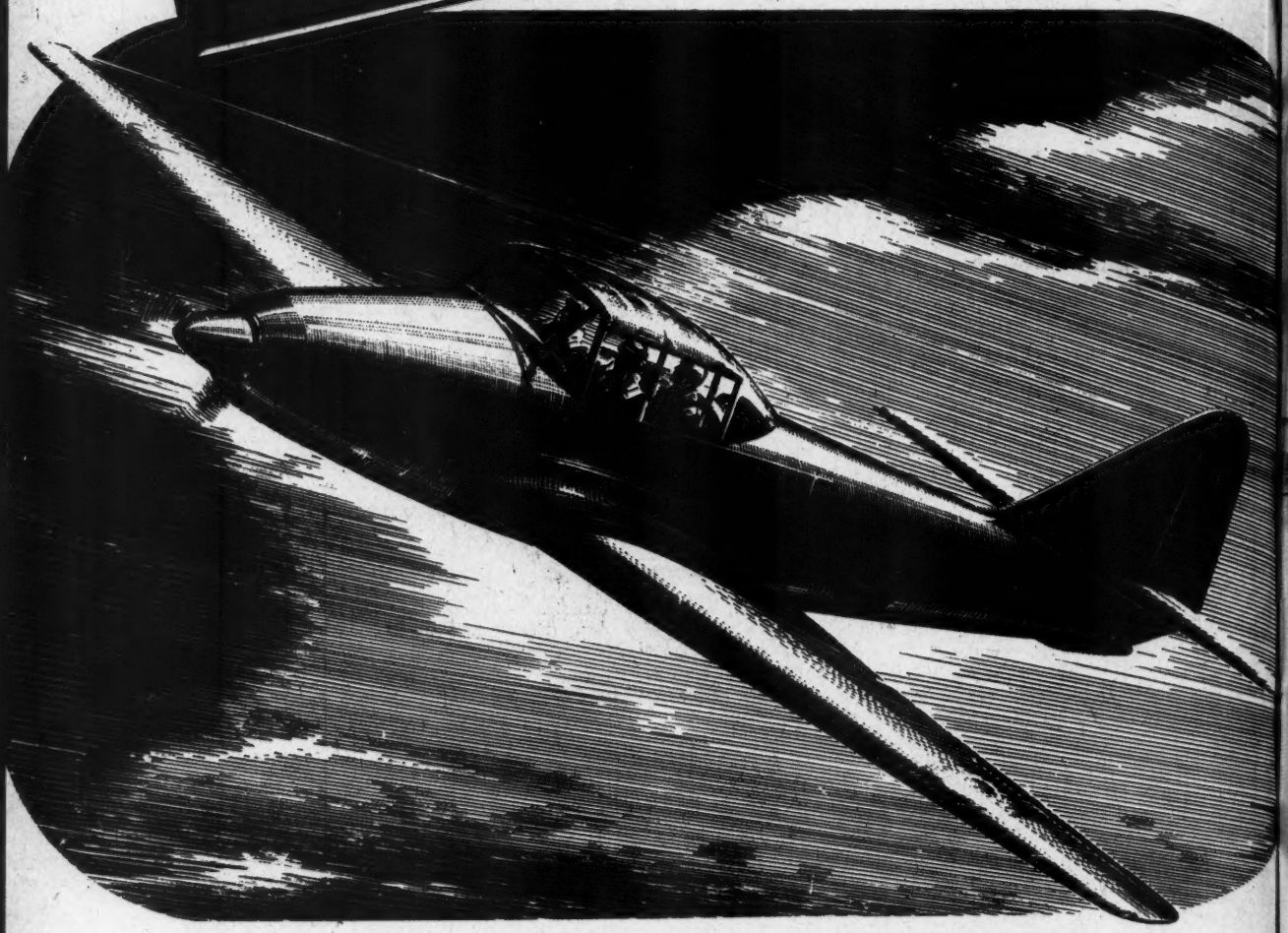
D H ENGINES



No. 4 *Flight, February 26th, 1948*

Do you remember?

The Avro 504N, fitted with an Armstrong Siddeley Lynx engine in 1924, extended the active life of this famous type for some 16 years, thus demonstrating extraordinary qualities of design and performance—qualities which are naturally reflected in the Trainer of to-day.



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Transports Today and Tomorrow

PART TWO: LARGE FLYING BOATS by H. F. KING, M.B.E.

THE recent description and discussion in *Flight* of the SR/45 transoceanic flying boat has stimulated an interest in this class of aircraft, which has survived formidable and often derisive attacks by landplane protagonists. Here in Great Britain, this interest—which, as remarked in the first article of this series, has in post-war years been largely academic—is sustained by a deep-rooted conviction born of long operational experience, though to some small extent it might be traced to an insular sentiment embracing all things having a hull.

Britain's partiality is shared by the French, who, in preparation for the construction of flying boats comparable with the SR/45, are already gaining experience with machines appreciably larger than British types in current use. In America, the Glenn Martin Company, far from renouncing the flying boat, has lately reaffirmed a belief in its commercial future— a belief, be it said, which does not appear to be shared by any established operating concern.

Before British, French and American designs are examined, a dispassionate statement of the qualities and shortcomings of the flying boat must be attempted. For more controversial reading, the *Correspondence* pages of *Flight* for the last weeks of 1947 are recommended.

Whether the "sentiment" factor is discounted or allowed, a more substantial explanation must be sought for the peculiar popularity of the flying boat among passengers, and it will probably be found that comfort and convenience, a sense of safety on over-water flights, and the sensation and interest of taking off from, and alighting on, water can be quoted in that order of importance. The tradition of comfort and convenience may be accounted for not only by the relatively spacious interiors of past and present flying boats (the provision of two decks is no novelty), but by the downward field of vision allowed by the inherent high-set wing. The only major drawback in the passenger's estimation seems, in fact, to be the relatively low cruising speed and the lack of pressurisation which characterise present types in use.

On the operational side more serious handicaps become apparent, though even these are claimed by exponents of the flying boat to be far less intractable than those attending the landplane. Formidable docking and handling problems, demanding costly and elaborate facilities on sheltered stretches of water, are unavoidable, though in recent years these difficulties have been mitigated by such innovations as the Saunders-Roe mooring and docking scheme. Servicing and maintenance, in face of salt-water corrosion, threaten to remain expensive items, despite new structural methods and materials, for not only is the earning capacity of the flying boat greatly reduced by periodic beachings or dry-dockings, but heavy demands are imposed on staff and equipment.

Water Runways

Though essentially true, the familiar assertion that the flying boat can operate from a ready-made airfield is in need of qualification, in that take-off and alighting areas must constantly be kept free of submerged obstructions and driftwood. It must be considered, moreover, that the freezing-up of harbours may necessitate diversion of services during some months of the year: thus the SR/45 would be unable to maintain the North Atlantic services to New York and Montreal in the winter and might have to be diverted further south, possibly to Baltimore. Devotees of the large flying boat are already visualising artificial "water runways," rather than the accepted type of "alighting areas," in which the prevention of ice formation would be feasible and which might offer, in return for a heavy initial outlay and upkeep costs, other important advantages.

TRANSPORTS TODAY AND TOMORROW...

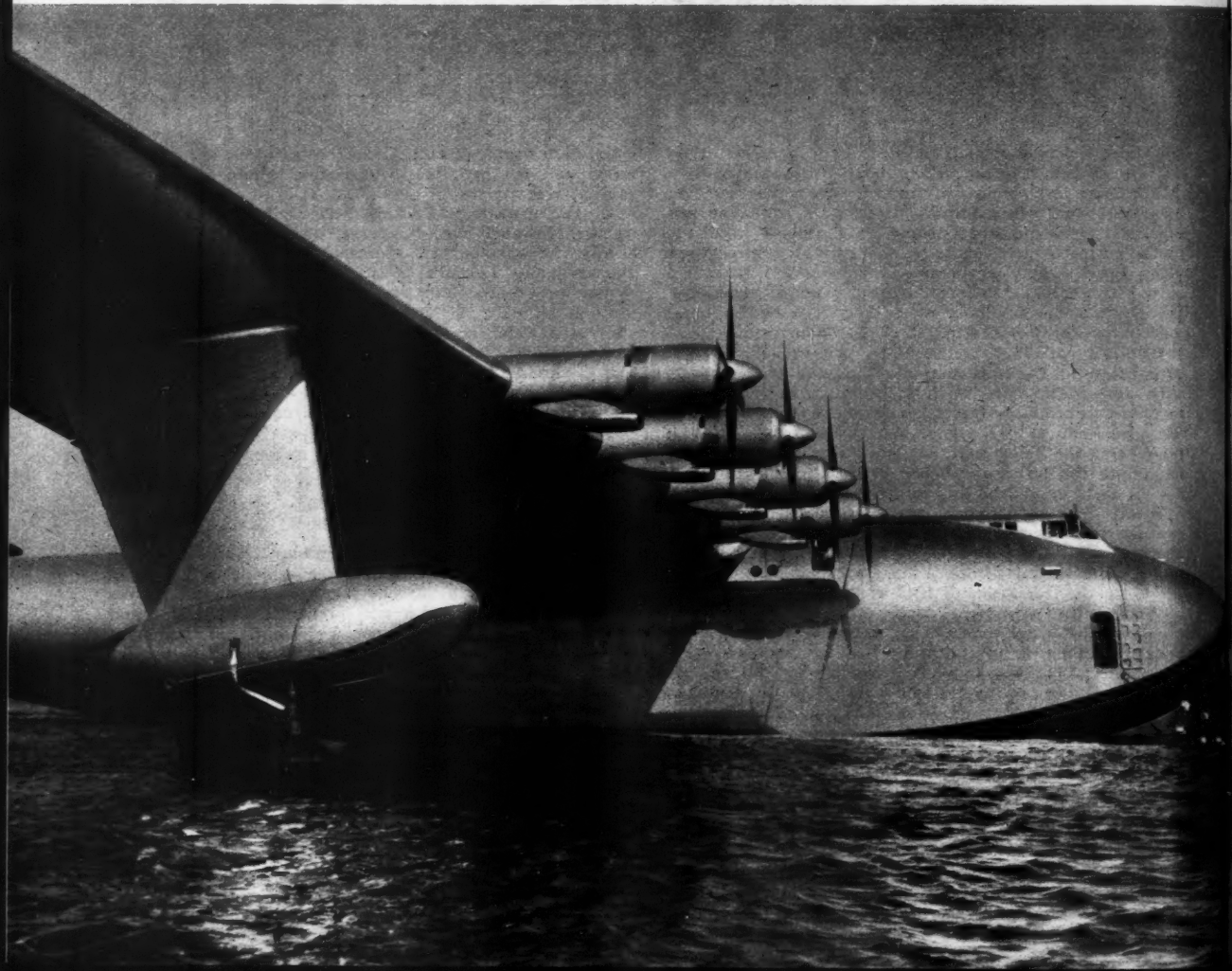
For the most profitable improvements, operators must look to the flying-boat designer. New technical concepts promise not only to increase speed—thus removing one of the principal disadvantages of the present-day flying boat—but to enable the flying boat, or water-based aircraft, to describe it more accurately, to exceed the carrying capacity, with or without aerial refuelling, of the corresponding landplane. Factors productive of speed are a reduction of hull dimensions relative to overall size; a general refinement in aerodynamic design (*e.g.*, the retraction of lateral stabilising floats); adoption of turbine power plants and pressurisation, allowing a great increase in operational height; and—perhaps most important—research into hull design, as exemplified by the work done by the N.A.C.A. in America.

The first major aerodynamic improvement, after redesign of the rear and main steps, has been the retraction of the lateral stabilising floats into the wing, a measure which, though obviously advantageous in current designs, will present some difficult problems when thinner wing sections are adopted, even should recourse be made to bifurcation, as on the SR/45.

Concerning power plants, the urgent need for piston engines and airscrew turbines of 4,000-6,000 h.p., for installation in projected flying boats has become disturbingly obvious. The application of the compound power plant to the long-range flying boat promises well, though this combination would seem best suited to Service requirements, where, for certain types of duty, economy may over-ride other desiderata. It is to the turbo jet that designers may look with confidence as a means of ultimately revolutionising flying boat design. The slim, axial-flow units, which seem likely to be standardised where extreme thrusts and economy are demanded, could be completely buried in a wing of moderate thickness, though hardly without detracting from ease of maintenance. Of greater importance is the consideration that the turbo jet will not prescribe the distance the wing is carried above the water. Should this distance be greatly reduced, however, the jet intakes must be so positioned that appreciable intake of water is precluded. In any case there seems to be no doubt (especially bearing in mind the performance already demonstrated by the SR/A1 twin-jet fighter) that the flying boat can be made aerodynamically efficient enough to benefit from pure-jet propulsion, though augmentation of take-off thrust by means of after-burning, A.T.O. rockets or other means may prove necessary.

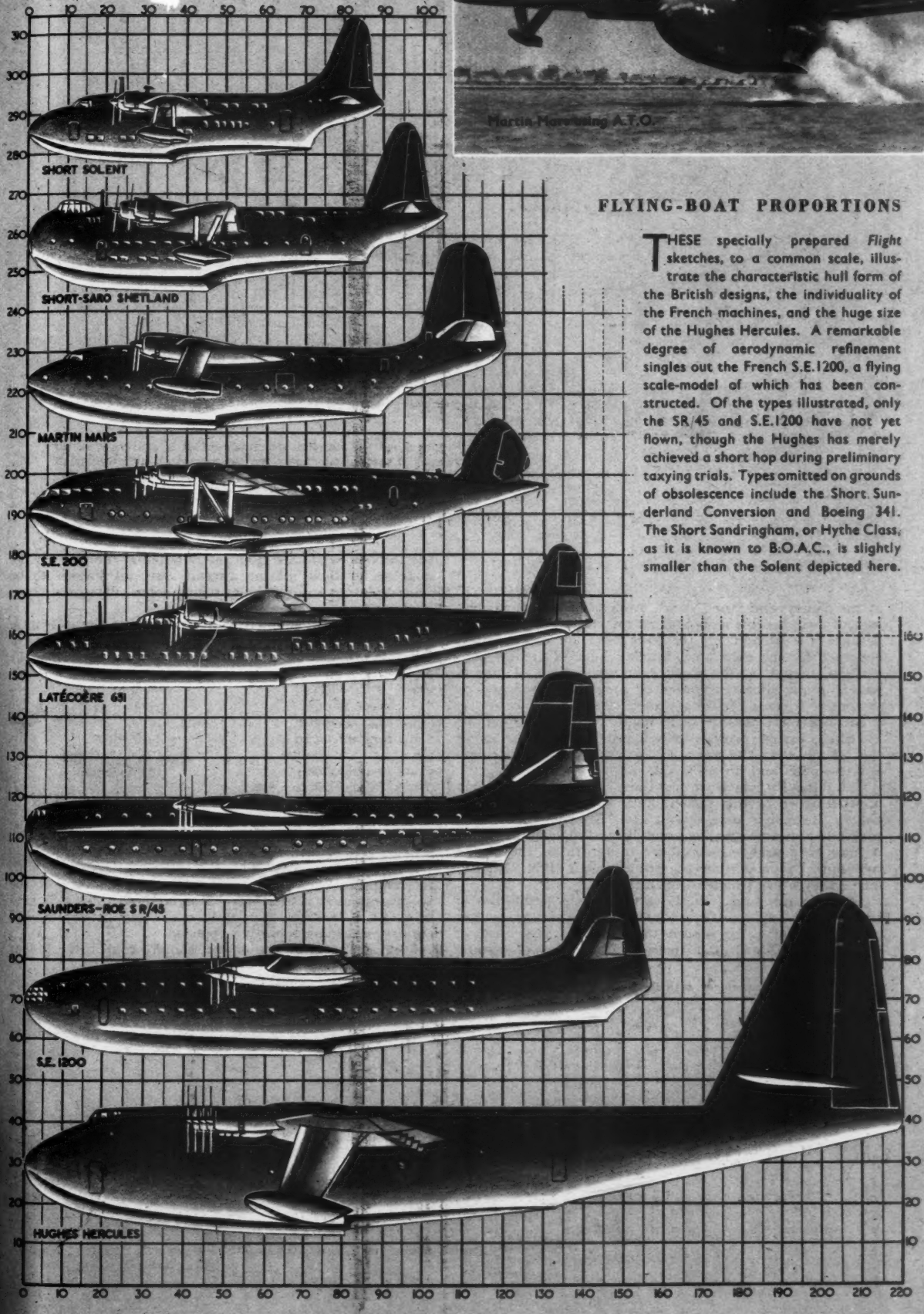
Developments now on trial at the N.A.C.A. include hulls with a length/beam ratio of between 10 and 15; the "planing tail" type of hull (stated by Mr. Grover Loening to decrease water resistance by half, and further to reduce air resistance); new bow designs; retractable spray strips

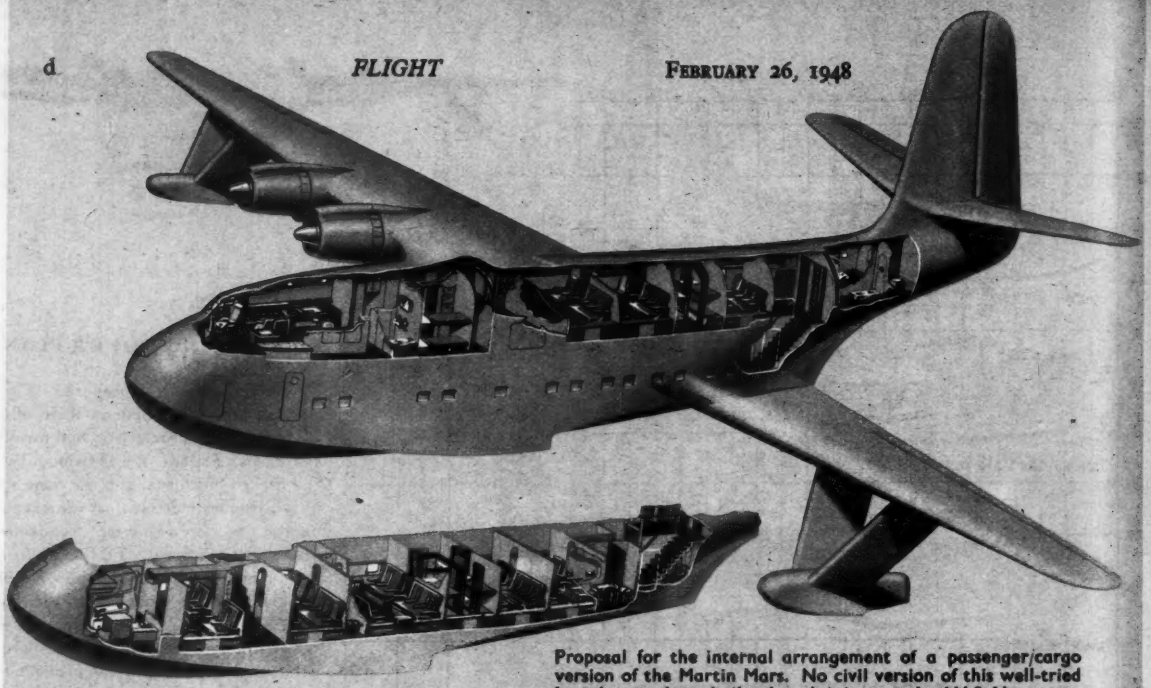
Though vast in bulk, the all-wood Hughes Hercules (eight Pratt and Whitney Wasp Major engines) is aerodynamically clean.



FLYING-BOAT PROPORTIONS

THESE specially prepared *Flight* sketches, to a common scale, illustrate the characteristic hull form of the British designs, the individuality of the French machines, and the huge size of the Hughes Hercules. A remarkable degree of aerodynamic refinement singles out the French S.E.1200, a flying scale-model of which has been constructed. Of the types illustrated, only the SR/45 and S.E.1200 have not yet flown, though the Hughes has merely achieved a short hop during preliminary taxying trials. Types omitted on grounds of obsolescence include the Short Sunderland Conversion and Boeing 341. The Short Sandringham, or Hythe Class, as it is known to B.O.A.C., is slightly smaller than the Solent depicted here.





Proposal for the internal arrangement of a passenger/cargo version of the Martin Mars. No civil version of this well-tried boat has yet been built, though it is a standard U.S. Navy type.

TRANSPORTS TODAY AND TOMORROW . . .

at the chines; and faired steps. Improvements in carrying capacity will become more apparent as overall sizes increase because the weight of the landplane undercarriage is governed by the cube law. Further hope of greater payloads is offered by the waiving or moderation of "rough water" requirements, regarded by progressive designers as restrictive legacies of military specifications.

An incidental benefit which might be derived from the use of gas turbine power plants is the diversion of some of the jet efflux to the steps, and perhaps to other critical points on the hull, to assist take-off.

One difficulty which will continue to exercise the flying boat designer is the vulnerability of lateral stabilising floats. Reversion to sponsons, or "sea-wings," will be prohibited on aerodynamic grounds, and in some instances it may be considered expedient to return to the classic twin-hull Savoia-Marchetti formula; but this will reintroduce its own peculiar difficulties.

Thus, having mused on the nature and potentialities of large flying boats we may examine the various types now being constructed, or known to have been projected, in Great Britain, France and America. At the time of writing, the Italians, who have been justly noted in the past for the qualities of their marine aircraft, are not known to be contemplating any machines which come within the scope of this survey.

The history of commercial flying boats in Great Britain is to so great an extent the history of the products of Short Brothers that its course up to the present can be plotted by a string of aircraft type names—Calcutta, Scipio Class, "C" Class, "G" Class, Sunderland Conversion and Sandringham. In nine and a half years of operations the "C" Class boats flew 34,779,242 miles, establishing an unrivalled tradition of service. The maintenance of this tradition is now becoming the responsibility of the Solent, the most modern type of flying boat to be delivered to B.O.A.C. and the type with which our brief technical inquiry may conveniently be opened.

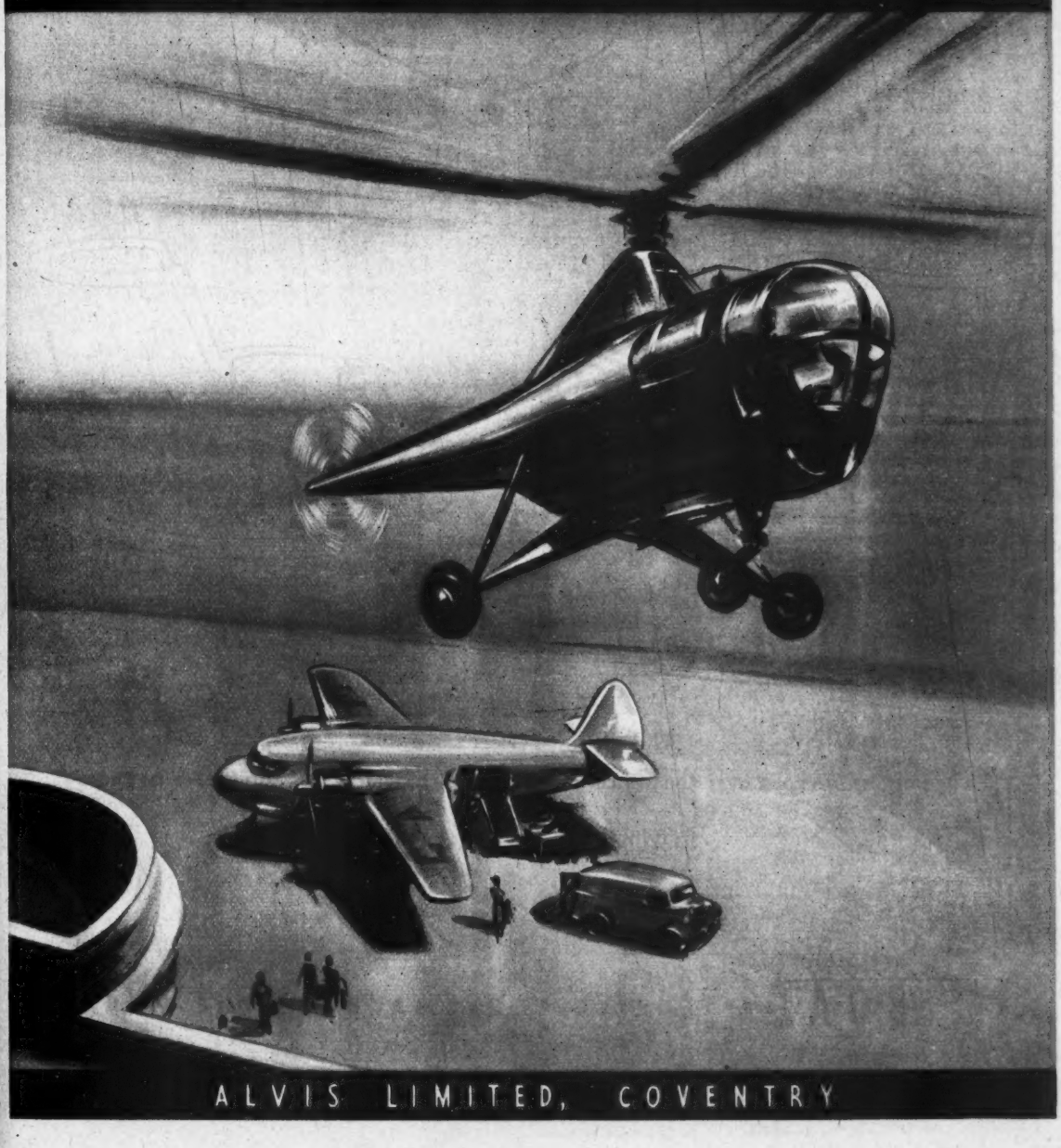
Welcome as it will be on the Empire routes, the Solent

Contemporary with the Latécoère 631, seen below, the S.E.200 (inset above) now has non-retractable floats.

ALVIS

Leonides

chosen for the Westland-Sikorsky S.51 Helicopter



ALVIS LIMITED, COVENTRY

'Then on, on we sped over the old canal. By gad, Troxwell, what comfort, what ease!

Flying boat, Sir, flying boat!'

B·O·A·C SPEEDBIRD ROUTES ACROSS THE WORLD

BRITISH OVERSEAS AIRWAYS CORPORATION

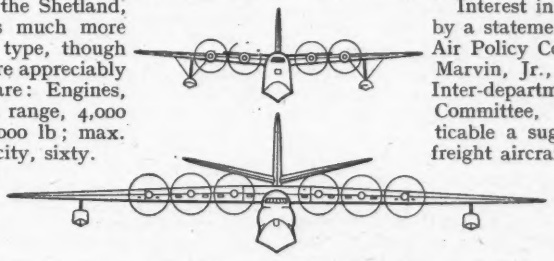
Transports To-day and To-morrow . . . .

is manifestly another development of the old "C" Class design of 1934, and is closely akin to the Sunderland and Seaford military variants. It is, in fact, a civil Seaford, and must not be considered as an example of what might have materialized had Short Brothers been given a free hand to produce the most efficient solution to B.O.A.C.'s requirements. The calibre of the Solent and of its immediate predecessors (both of which remain in service) can be gauged from the following abridged specifications:

	Sunderland Conversion	Sandringham	Solent
Engines...	4 Pegasus (3,920 h.p.)	4 Pegasus (3,920 h.p.)	4 Hercules (6,700 h.p.)
Range	1,410 sea miles	1,790 sea miles	2,000 sea miles
Gross weight	56,000 lb	56,000 lb	75,000 lb
Max. speed	182 kt	185 kt	240 kt
Passenger capacity ...	40	21- and 45-seat versions	30

The relatively low speeds are largely attributable to the age of the basic design and to unavoidable concessions to military requirements. Even the Shetland, the basic design of which is much more recent, is a modified Service type, though its performance and capacity are appreciably superior. Comparative data are: Engines, four Centaurus (10,000 h.p.); range, 4,000 sea miles; gross weight, 130,000 lb; max. speed, 230 kt; passenger capacity, sixty.

It will thus be seen that the SR/45 is the first British flying boat of recent years in the design of which civil needs have been given prior consideration. This epitome of British conviction, skill and hope has been designed to have the range and speed required for a direct London-New York service against a continuous headwind of 60 m.p.h. and to be suitable for medium, long and extreme-stage services in any part of the world.



Frontal aspects of the Short Solent (top) and the Saunders-Roe SR/45, showing that the sectional area and depth of the hull have not increased in proportion to overall size.

Briefly, the "45" can be described as a high-wing monoplane of 220ft span with a 146ft hull of relatively small "double-bubble," or, more descriptively, "cottage loaf" section. For the first time, perhaps, the dimensions of the hull have been governed primarily, not by water clearance or seaworthiness, but (as is the size of a landplane's fuselage) by considerations of performance and stowage space. The cross-section was dictated by pressurizing requirements, and with the addition of a planing bottom, chines and upswept stern section, appears to give a much less favourable aerodynamic form than that selected for the fuselage of the Brabazon. Preliminary performance data, however, suggest that the hull shape is aerodynamically more efficient than might at first be supposed, though in considering the estimated cruising speed of "over 350 m.p.h." it must be remembered that the SR/45 is to be powered with no fewer than ten Bristol Proteus airscrew turbine units, whereas the Brabazon, of somewhat larger dimensions, (though of lower all-up weight) will have only eight. The choice of this particular type and number of power plants was governed by availability of airscrew turbines, and eight units of 5,000 h.p. each would doubtless have been preferred could these have been developed in time.

Flying-boat construction in America has in the past been principally in the hands of the Boeing, Sikorsky, and Martin concerns. Now only Martin remains as a potential producer, in the immediate future, of large marine aircraft for commercial operation, and only one type of flying boat—the Mars—is at present available. The U.S. Naval Air Transport Service is successfully operating military versions of the Mars on the Alameda-Honolulu run, but there is little likelihood that the Mars, already ageing in design, will be adopted by any commercial airline.

A Civil Mars

A projected civil version of the Mars, announced over two years ago, was to have been a considerable improvement over the military versions, and it was claimed that fully 52½ per cent of its 87½-ton gross take-off weight could be devoted to useful load on the cargo version and 48.1 per cent on the all-passenger model. Pratt and Whitney Wasp Major engines were specified, and, at ¾ power, the machine was to carry 50,550 lb of payload for 2,076 miles at 204 m.p.h.; 36,700 lb for 3,000 miles at 208 m.p.h.; or 12,690 lb for 4,650 miles at 213 m.p.h.

Interest in the Mars was revived recently by a statement made before the President's Air Policy Commission by Mr. Langdon P. Marvin, Jr., formerly the Chairman of the Inter-departmental Air Cargo Priorities Committee, who discounted as impracticable a suggestion for building a fleet of freight aircraft for the military services and "putting them in mothballs" until needed in an emergency. A more suitable method of developing "a Merchant Marine of the air" would, in Mr. Marvin's view, be the promotion of a domestic, and especially international, air trade, whereby aircraft might earn their salt in peacetime. They could, he claimed, be kept busy flying commercial cargo and thus would be useful if America remained at peace and ready if she went to war. It was necessary, he claimed, to find a formula to combine both military and commercial interests—to design a "combination sword and

The second Short Shetland, powered by four Bristol Centaurus engines, on an early flight from the Medway. On this occasion the Shetland was not flying at its maximum weight of 130,000 lb.

Transports To-day and To-morrow . . . . .

ploughshare." Of interest is that the Mars has been successfully taken off at a weight of 155,000 lb with assisted take-off rockets. At 148,000 lb, again with A.T.O., the machine left the water in 32 seconds, whereas under its own power it would have required 55-60 seconds. The captain reported that 78 seconds from the time the engines developed full take-off power the machine had attained three-engine safety speed (110 kt) and was 100ft in the air. At that time, without A.T.O. rockets, it would have been running on the surface at 75 kt. The possibilities of A.T.O. are considered by the U.S. Navy to be especially important in hot climates, where a 100-second take-off could damage an engine; in an emergency landing at sea, where the rockets would permit the Mars to take off on three engines; in a sea too rough for a normal take-off; or in a confined area where the take-off run was too short to permit a get-away on engines alone.

For the present there is no intention of using A.T.O. rockets on large passenger-carrying flying boats, though these aids might be beneficially applied to freighters of the class so strongly advocated by the Martin Company.

Technical data relative to the colossal all-wood Hughes H-4, which has already cost many millions of dollars, are scarce and indefinite. As this is written, the Hercules, as the monster is known, has not started its flight trials, though a circumspect one-mile hop at a height of 70ft was achieved during taxying trials for the benefit of critics, whose machinations seem to have beset the project since its inception in 1941.

With its wing span of 320ft and length of 220ft, the Hercules is nearly half as large again as the SR/45, and to lift its designed weight of between 200 and 225 tons, the 28,400 h.p. of eight 36-cylinder Pratt and Whitney Wasp Major engines is required. Intended primarily as a military cargo and personnel transport the Hercules is reported to have accommodation for up to 750 persons, though the degree of comfort and corresponding range are not specified.

If nothing more, the Hughes flying boat is a monument to the temerity of a young American, who has already achieved and endured much, and to the constructional skill of those he gathered around him.

FRANCE

The writer has had the privilege of flying in each of the two types of large commercial flying boat constructed, under the handicaps of enemy occupation and material shortages, by the Latécoère and Sud-Est organizations. Of these two—the Latécoère 631 and SE 200—only the former has passed into production, though having in mind the lack of suitable power plants and other factors, both are remarkably fine achievements.

Of the ten Latécoères already built or on order, six are understood to have been earmarked for Air France. Both these French machines were built to an official specification dating from 1936 and calling for a Transatlantic flying boat.

The version of the Latécoère demonstrated in this country last year has an all-up weight of over 157,000 lb, and is fitted with six Wright Cyclone GR 2600 radials of 1,600 h.p. each, allowing cruising speeds of up to 185 m.p.h. The later boats of the series will have more powerful Wright engines, but the best performance would be given by six Bristol Hercules, estimated to increase the cruising speed by as much as 40 m.p.h. Though a hundred passengers may be carried over short distances, the standard version seats 46, allowing stowage for 7,000 lb of freight, the range in this case being over 3,700 miles against a 35 m.p.h. headwind.

The Sud-Est machine has six Gnôme-Rhône 14 R engines and, flying at a weight of 159,000 lb, accommodates 80 day passengers or 40 sleepers. Work on the fourth machine of the type, now 90 per cent complete, has been abandoned, but Sud-Est are extremely active in flying-boat research and development. Information which should soon be forthcoming from a 12,000-lb four-engined flying scale model will be put to good account in the construction of the 309,000-lb SE 1200, a civil flying boat of extremely advanced design, intended in the first instance for eight 4,000 h.p. Arsenal 24 H piston engines, but later for Armstrong Siddeley Python gas turbines. The salient features of the SE 1200 may be appreciated from the sketch on page *c*. It will be seen that the hull entry is remarkably clean aerodynamically, and that the planing bottom extends almost to the stern of the hull. The power plants are paired (thus there are only four nacelles) and drive contra-rotating airscrews, and the lateral stabilizing floats are partially retractable into the extreme wing tips. With Python engines, and flying at a weight of 309,000 lb, the SE 1200 should carry 125 passengers, in reclining chairs, for 3,750 miles. The remarkably high maximum speed of 435 m.p.h. is calculated.

This advanced design, backed by vast research facilities now in preparation, is expressive of France's resolve to exploit to the full her flying-boat experience and her technical skill in the design of large marine aircraft.

SIR ARTHUR CONINGHAM

REPRESENTATIVES of the Air Council, the Royal Air Force, Government Departments, the Dominions and of many foreign air forces attended the memorial service to Air Marshal Sir Arthur Coningham, held at St. Margaret's, Westminster, on February 17th. Canon Charles Smyth officiated, assisted by the Chaplin-in-Chief of the Royal Air Force, The Reverend J. A. Jagoe, who gave the address. Marshal of the Royal Air Force Lord Tedder read the lesson.

The music was provided by the Central Band of the R.A.F., and a Guard of Honour was formed by aircraftmen. Last Post and Reveille were sounded at the end of the service. The Rev. J. A. Jagoe recalled that on the last Sunday of the Second Tactical Air Force, at Bad Eilsen, on July 8th, 1945, "Mary" Coningham was anxious that he and his men should make an act of worship before the Throne of God. He specially wanted one hymn included: "Immortal, invisible, God only wise," and it was fitting that this hymn should now be sung in his memory.

On Saturday, February 21st, a memorial service was held at St. Andres's Cathedral, Singapore, at which the Bishop of Singapore and G/C. F. Trevor officiated. The address was given by Air Marshal Sir Hugh P. Lloyd.

OFF AGAIN

CAPTAIN BARTLETT, Bristol's energetic sales director, left this week-end on another trip to South America (his third). It would be interesting to know if there is anyone else who has travelled so many miles in so many different countries since the war in order to promote British exports. In addition to his South American trips, Capt. Bartlett has visited Canada twice, Australia and New Zealand by way of India and Malaya, returning by way of the Pacific. On top of these Empire journeys he has made comprehensive tours of Europe.

BRITANNIA TROPHY

THE Royal Aero Club announce that the Britannia Trophy, which is given each year for the most meritorious performance in British aviation, has been awarded for the year 1947 to S/L. H. B. Martin, D.S.O., D.F.C. (pilot) and S/L. E. B. Sismore, D.F.C. (navigator), for their record flight from London Airport to Capetown in 21 hours 31 minutes and 30 seconds on April 30th—May 1st, 1947.

Flying a de Havilland Mosquito, Type P.R.34, they covered the distance of 6,011.01 miles (9,673.370 km) at an average speed of 279.256 m.p.h. (449.400 km.p.h.).

THE NEW SCHOOL

UNTIL fairly recently, there grew up with aeronautical engineering a belief in certain circles that ultra-precision in aircraft is a costly and unnecessary luxury. While this view may have been justified in the early days of empirical methods, it becomes increasingly apparent that aeronautical engineering, with continually growing knowledge, has now taken its place among the so-called "exact" sciences.

The acceptance of this view is demonstrated by the fact that at the College of Aeronautics, Cranfield, highly accurate measuring equipment forms an important part of the apparatus installed for instructional purposes, and includes instruments which can measure to a few millionths on an inch. A number of these instruments, of German (Zeiss and Leitz) origin, are described in the March issue of *Aircraft Production*.

Casual Commentary

Where Do We Go From Here? : Irrational Aircraft Layouts : Accidental Progress : A Few Suggestions for Experiment

By ROBERT CARLING

IN one's more liverish moments it is difficult to feel full confidence in the use of the word "progress" when applied to the science of aeronautics in all its aspects. Indeed, I sometimes wonder whether we may only have found a comfortable groove down which we are travelling at a steadily increasing speed, and with consequently reduced possibilities that we shall ever find ourselves able to deviate far from the path marked out so long ago.

Perhaps it is because aircraft layouts have remained relatively unaltered that designers are still, with the best will in the world and with a considerable background of experience, finding it necessary to compromise over so many of their difficulties. And the difficulties are of a kind which will inevitably be with us so long as we retain our conventional ideas about the shape to which an aircraft should conform.

One of the more useful exercises of will and imagination is that of attempting to disassociate oneself from normal surroundings and habits of thought; trying, in fact, to see the human animal's shape and behaviour as these might appear to an extremely rational visitor from another world. If you apply a similar system to an honest examination of present-day aircraft, the shock sustained is nearly as profound.

Take just one feature—the power supply. For good reasons it is necessary to use two or more engines, each self-contained and capable of operating as a completely separate unit. What do we do with them? Install them all conveniently in an engine room? Dear me, no; we hang them out along the leading edge of the wing (of all places) so that every one can offer a, however carefully minimized, maximum resistance. We then make each drive a private airscrew—and out in front so that the complicated helical gale thus produced will blow all about an important area of the lifting surface and will later arrive, quite incalculably distorted, in the vicinity of the aircraft's most vital control surfaces. Finally, an international body goes into a long and expensive huddle about the effects of all these contrary winds. This body afterwards produces a set of ingenious minimum requirements whereby reasonable safety shall still be possible in spite of the lunatic aircraft layouts which have been quite accidentally evolved.

Time/Circumstance Compromise

For the present aircraft layout *is* an accident. It is largely the heir of circumstance and conservatism. Circumstance—because wars have forced design too quickly along accepted channels; time has so often been at a premium. When, in the early days, more power was required to lift greater loads, it was natural and necessary to make use of available engine and airscrew installations, arranged in their customary manner, but hung out, like so much washing, on the structure. In the case of single-engined aircraft, not until the arrival of jet-reaction power was it immediately and obviously necessary to arrange things so that the thrust was applied at the logical place. Conservatism—because few designers have dared to risk their reputations in leaps in the dark, with little or no practical experience for use as a guide in the darkness. Aircraft shapes and layouts have been slowly modified step by step, so that the piston-engined fighter of 1948 has really the same fundamental appearance as the cross-Channel Blériot of 1909, and the multi-engined transport is only a cleaned-up variant of the Sikorsky of 1913. Maybe if the tail-airscrewed Paulhan-Tatin (circa 1913) had been a success, we should see very different aircraft to-day, and there must have been something pretty fundamentally wrong with its great-grandchild, the Mixmaster of 1945, to cause its makers to drop it so completely after the prototype had been destroyed—in circumstances which did not, on the face of them, point to a fault in the design as such. Possibly the operators turned up their noses too obviously at its projected civil counterpart, the DC-7, and no more money was forthcoming from the American Treasury for its development for military purposes. No doubt, too, there were lots of mechanical and control problems.

But, since we can so rarely make a trouble-free aircraft of conventional design, I cannot see that a few more control problems are going to break our hearts. I doubt if there have been more than a couple of civil aircraft flown since the war which have not suffered from serious forms of back-end trouble—thanks largely to the cavortings of the slipstream as it revolves, bounces off the flaps and hits the tailplane and fin from obscure angles and at varying speeds. Of course, if we knew which way all this air was going, we could design a curious asymmetrically adjustable empennage to suit, and, if it wasn't so troublesome and expensive to the operator, we could fit handed engines—these might at least give a symmetrical slipstream pattern.

In the meantime, I have never understood why it is that prototypes are not fitted with tailplanes which are quickly adjustable for both incidence and position. Almost always this unit has been found, after the early flights, to be at the wrong angle—if not in quite the wrong position—yet allowance is rarely, if ever, made in the design for this possibility. Admittedly, it is quite a business to incorporate a screw-jack where none will be required in any later aircraft of the series, and even more of a business to arrange things so that the entire tailplane can be offered a variety of positions relative to the fuselage. But, if this were done, fewer man-hours might, in the end, be wasted, and there would be a far better chance that the final production aircraft would be as nearly perfect as possible.

Variable Incidence

More than once aircraft have gone into production with imperfect characteristics, simply because neither the time nor the labour could be spared for any further experimentation before pressing the production button. While we are at it, we might even dare to suggest the incorporation, in some cases, of means for variation of the wing incidence. This is not likely to be often necessary, but, if the adjustment is relatively straightforward, the change can be made experimentally and without any feeling that it constitutes a major modification—and there must be many cases where such an otherwise impossible alteration would offer the most satisfactory means of curing certain fore-and-aft difficulties.

Finally, if we have not already spent too much money on so many orphan aircraft of fairly conventional design, I would suggest to the Powers that they fling just one more stake on to the aviation gaming table. And this time they can put it on something other than tailless aircraft, with their innate tumbler-pigeon habits and strange stall-reversals, or Brobdingnagian prestige liners. Let us spend a couple of million pounds, before we are sold up, on a rational aircraft. Not a particularly big or fast one—just one in which a real effort has been made to think again from first principles.

In all the confidence of ignorance, I know exactly what I should make if I were given the money to do it. It would look like a very large single-engined aircraft of conventional design—but it would travel in the opposite direction. Even

Casual Commentary . . . .

the bare mention of such a *canard* will be enough to bring angry tears to the eyes of all designers. But are the aerodynamic and other problems involved quite insuperable, or the disadvantages such that the practical advantages in medium and large sizes are quite outnumbered? I find it difficult to believe.

What are the advantages? Well, primarily that we should get rid of all these slipstream, asymmetry on engine failure, and airflow-disturbance troubles. The most obvious cure for these is to put the means of propulsion at the back, just as it is with nearly all other devices for artificial locomotion. To do so with a conventional aircraft layout and c.g. means that the contra-airscrews would need to be driven by long shafts with lots of universals. This is not likely to be very practical, so we must take the engine-room to the airscrews and alter the aircraft layout accordingly—which will produce either a *canard* or a near-tandem.

If, after the initial hops with this aircraft, the test pilot brings back a series of terrifying obscure control-reaction findings, the chief aerodynamicist concerned can comfort himself with a reminder of the fact that the late Mr. Orville Wright found that he was suffering from serious elevator overbalance on his first flight in 1903. And his elevators were in front.

Contour Sketch Fixing

Important Development in Reconnaissance Survey Work

THE principle of the Decca Navigator system has successfully been applied to survey work, in particular by the Danish Government. For these purposes, portable transmitting stations are established at selected positions to provide an appropriate signal lattice coverage of the area to be investigated.

Two important features of the Decca system are the rapidity with which a fix can be obtained at any instant, and the property of operation at low altitude or ground level without sacrifice of working range. The combination of these qualities offers a novel method of sketch mapping which is of particular importance in reconnaissance survey and exploration.

A trial was made in January of this year, when a D.H. Rapide equipped with a Decca receiver was flown around the coastline of the Isle of Wight. An observer in the aircraft recorded the values of two Decca co-ordinates continuously throughout the flight, and the readings so obtained were subsequently plotted as fixes on a hyperbolic grid covering the area. The pilot attempted to follow all changes of direction in the boundary within the limits of manœuvrability, and maintained an average *terrain* clearance of about 400ft.

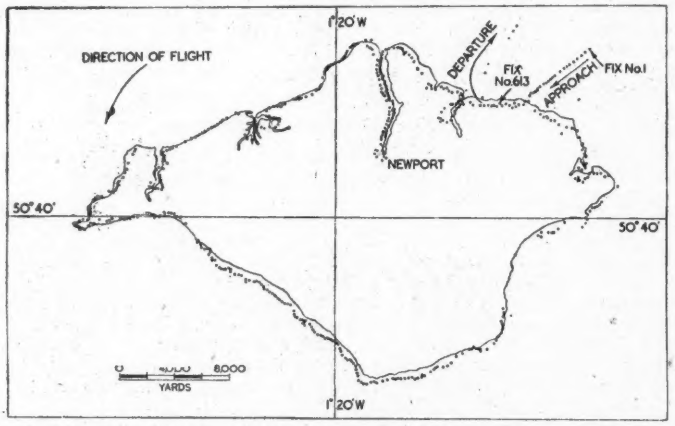
The illustration shows the finished result, which was completed in fifty-one minutes' flying time. Each dot represents a fix derived from a pair of co-ordinate readings recorded by the observer. The hyperbolic grid on which the fixes are plotted is in correct geographical register with the superimposed outline of the coast, but the grid itself has been omitted for the sake of clarity.

Comparing the fixes with the true coast line, it will be seen that in general the main features are well reproduced. The aircraft flew down the east bank of the Medina river as far as Newport, where a false widening of the river appears owing to the recording of a number of fixes while the aircraft was turning to make the return run up the west bank. The limitation imposed by the turning circle is evident at other points inland. The average displacement of the plots from the true coast line is of the order of 400 yards. Such was the rate of recording (613 fixes were taken in the fifty-one minutes—about one every five seconds) that displacements of several hundred yards will have occurred in reading alone, apart from positioning errors arising in the attempt to hold the aircraft exactly over the curving coast line.

Two gaps will be noticed, in the north-west corner of the island and, except for one isolated fix, in the region of Sandown; these resulted from airsickness on the part of the observer, who was unaccustomed to prolonged aerobatics.

The Rapide had not previously been fitted with Decca. For the purpose of the test it sufficed to place in the aircraft a complete unit comprising the receiver, rotary converter and indicator meters, connecting it to the main 12-volt power supply and to the fixed W/T aerial.

The results of this first trial of radio sketch-mapping show considerable promise, even though the very crude technique employed did not allow the full accuracy of the Decca system to be realized; indeed, there is little doubt that the performance obtained would represent a valuable aid in exploration, ice-survey and the like. The trial served to indicate the very high speed of the mapping operation, the freedom from restriction in operating height and the ease with which the receiver can be installed in a few minutes in any aircraft equipped with an aerial. The ability to obtain a useful result simply by recording the fixes in a note-book also represents a considerable advantage, although it is clear that greatly increased accuracy would accrue from the use of an instrument-recording camera. Combined with automatic recording, the use of very-slow-flying aircraft or helicopters may well enable the technique to contribute to a wide variety of reconnaissance survey operations



Map showing the 631 fixes taken during a 51-minute circuit of the Isle of Wight.

HASTINGS TOUR

A HANDLEY PAGE Hastings military transport aircraft (four Bristol Hercules engines) is to make a 26,000-mile flight from Britain, to Australia and New Zealand. The trip, which will start in March and will last about six weeks, is being made under the auspices of the Ministry of Supply and the Hastings will stop in Malta, Egypt, Pakistan, India and the Dutch East Indies. Technical data will be gathered concerning intensive flying and tropical conditions and the makers of the airframe and engines are interested in demonstrating the qualities of the Hastings to potential users.

Deliveries of the Hastings are now being made to the R.A.F.

HAWKER SIDDELEY REVIEW

TASTEFUL production combines with informative reading matter to make the *Hawker Siddeley Review*, the first (February) issue of which has just appeared, a model of what a house journal should be. The purpose of the *Review*, which is edited by Mr. G. D. S. Garrett, is to record the activities of the Hawker Siddeley Aircraft Co., Ltd., and its ten operating companies. Mr. T. O. M. Sopwith, chairman of the parent company, has written his inaugural article round the theme that the courage to think must be allied to the capacity to do. Certainly no organization has demonstrated better than his own the possibilities of integrated thought and action.

An Account of a Familiarization Flight

By Capt. DAVID BRICE, A.R.Ae.S.

IT had been a job that we'd discussed in the summer, made some rough plans and then rather forgotten. Then suddenly it had come up again, and in a matter of a few days the necessary people had been up North for a course on the Lincoln, the travellers' cheques had been prised out of the Bank of England, and almost before we could say "Buenos Dias," runway 28 was slipping below us at London Airport and vanishing into an icy November mist, as we climbed up on course for Casablanca and all points south.

On board were two junior captains of Skyways, Messrs. Hagues and Iveson, who were to be responsible for further delivery flights of Lincoln bombers to the Argentine, and my job was to give them essential route familiarization and sort out any incidental snags which might arise over handling, refuelling, etc. We also carried a navigator, Mr. Johnson, and Mr. Peake, a radio officer.

It was my first experience of the Lincoln, and knowing that its all-up weight was as high as 73,000 lb, and had even been cleared for special work above 80,000 lb, I expected a pretty "heavy" aircraft. I was mistaken, however, because the controls were lighter than those of the Lancaster, and as we climbed up through the murk above Woking, I found it an easy aircraft to handle, and the flying instruments stayed where they should be without undue effort. Our take-off weight was about 69,000 lb, and at this we climbed quickly with a power setting of 2,850 r.p.m. and +9 lb/sq in boost.

The power plant of the latest Lincoln is the Merlin 621, more or less the same as that installed in the Tudors, and for this reason it was of some interest to fly behind, or rather in front of, four of them. It seemed to me that a remarkable range of power settings was available; they extended from 2,850 r.p.m. and +9 lb/sq in boost down to 1,800 r.p.m. and +9 lb/sq in boost. The latter engine speed caused me a few twinges, because I instinctively felt that the B.M.E.P. must be "way up." However, the makers recommend it, and I always feel that they should know best.

Rio de Janeiro with the famous Sugar Loaf mountain in the background.

Setting Course

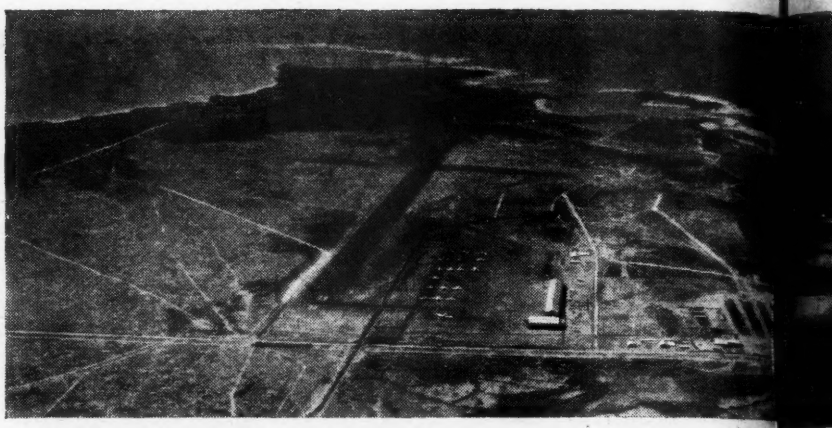
We continued our climb to 10,000 ft and then settled down on course for Cape Finisterre, which is on the N.W. corner of Spain. This involved a slight detour, but the direct route over the mountains promised to be too turbulent for comfort.

Having little practical experience of airframe or engines,

By Lincoln to Argentina

we set off more or less on handbook figures, and reduced power to 2,400 r.p.m. and +7 lb/sq in boost. This gave us an indicated speed of 175 knots and a true air speed of 203 knots. At this setting we discovered that our four engines consumed about 245 gall/hour between them.

The Lincoln has a standard tankage of 2,850 imperial gallons, but with a variety of auxiliary tank assemblies, including a saddle-back arrangement with the tank mounted on the top of the fuselage, and another carried in the front gun turret, the fuel capacity can be increased to over 4,000 gallons. For our trip we had the standard installation which, at semi-long-range cruising power, gave an endurance of about 12½ hours.



Dakar (Mallard) airfield, Senegal, West Africa.

Our crew comfort arrangements were scanty in the extreme, and for the first three or four hours we sat bunched up in front, until the outside air temperature climbed up to a more comfortable level. Cape Finisterre passed by under some rough cumulus, and we flew down the Portuguese coast, twisting around cu. nimb. until we reached the Tagus, where the sun was shining on Lisbon and Estoril.

Our schedule called for a night stop at Casablanca, and with the promise of a warm night in the Moroccan desert, we flew on past Cape St. Vincent. Once over the sea we began our descent to avoid the worst of a cold front which lay across our track. Our passage through this coincided with the twilight, and lightning flickered about us in the half-light as we got our first glimpse of the lights on the Moroccan coast.

Casablanca came up well on the V.H.F., and before long the city lights were below us, whilst the clear sky above seemed to reflect their brilliance. Casablanca airfield is a by-product of the American occupation and possesses one 2,000-yd concrete runway, which we found ample for our night landing.

Not a Signal Success

As I've said, we'd counted on a night stop at Casablanca, but due to a confusion over signals from Paris, the Air France representatives were not expecting us, and so no accommodation had been booked. What was even more annoying, however, was that apparently none was available. Casablanca, in company with practically every other sizeable city in the world, was chock-a-block, and with the exception of the houses of dubious repute, there wasn't a bed to be had anywhere. There was no alternative but to refuel and carry on to Dakar, some seven hours' flying away.

By the time we'd enjoyed a well-cooked steak, refused the vin rouge and checked with met., the cold front was menacing Casablanca, and frequent lightning flashes lit up our windows as we started off down the runway with a gusting cross-wind on our starboard beam. The Lincoln is no trouble under such conditions, and the ample take-off power available at +18 lb/sq in boost soon lifted us off the runway. We flew along the coast for a while, skirting the Atlas Mountains, which stood over to our left, and then set course direct over the desert for Dakar.

Linc/Lanc Similarities

As we flew southwards I reflected how similar in appearance and in detail the Lincoln is to the Lancaster. The cockpit is almost entirely the same, but it does boast some improvements. Electrical engine-priming is fitted, thus avoiding the tiresome necessity for a climb into the engine nacelle for this function.

No tank cocks are provided, which greatly simplifies the petrol system, and all six tanks feed into two junction boxes, one for each pair of engines. A useful feature of this arrangement is that it enables all but two of the fuel tanks to be drained right down without fear of airlocks occurring in the system.

On this sector we operated with a slightly reduced power-setting, about 2,300 r.p.m. and +6 lb/sq in, and found that our fuel consumption dropped to about 230 gall/hr. Our air speed also fell to 165 knots I.A.S., which represented 182 knots at 6,000 ft. We were cruising at this altitude because of headwinds aloft.

We asked Gibraltar for a route forecast to check the French one we had obtained, and with reasonable weather in front flew across the desert, past Port Etienne, over Mauritania, and in due course came to Dakar. Dakar, another product of the American war effort, is a busy airport, and whilst we were calling Yoff Tower on our V.H.F. we could hear a Pan American "Connie" getting its take-off clearance, and soon saw him climbing up below en route for Lisbon. Then, a few minutes later, as we touched down on the flare path, a K.L.M. machine took up position hind us and then roared up into the black sky on its way to Natal.

Casablanca (Cazes) airfield, Morocco.

By this time it was 0500

Natal (Parnamirim) airfield, Brazil.

G.M.T., and a bed, after three eggs and bacon, was our main interest. We were soon asleep in the Air France hostel.

The South Atlantic is a much less boisterous stretch of water than its northern counterpart, and apart from an inter-tropical front spread across the Doldrums, which is seldom very active, there are no special problems. On the West African coast the Harmattan haze frequently reduces visibility, with its dust-laden breath from the Sahara. It's not often that it gets less than one mile, and, with Yoff's Radio Range, approaches to land are simple. In the Monsoon season, August and September, some copious precipitation and thunderstorms, with an occasional cyclone thrown in, can be expected. Our flight was in November, the best time of year, so we expected no trouble with the weather.

We were surprised then to be awakened by heavy rain, and for most of our sojourn in Dakar it rained. This was something of a freak, and was due to a small depression centred over Senegal. We were also surprised to find that our flight forecast gave headwinds at 10,000ft. On the sector Dakar-Natal the average wind component is usually easterly, and thus one can reckon on a flight of about 7½ to 8 hours. The return journey usually takes an hour longer. On this occasion our flight plan came out to 8 hr 35 min, and on this we left Dakar at 15.40 on the afternoon of November 29th.

Tropical Climb

No temperature troubles were experienced with either coolant or oil, and we climbed easily to 6,000ft before settling down to 2,300 r.p.m. and +6 lb/sq in boost. We carried 2,650 gallons of fuel, sufficient for 11½ hours' flying.

It was a bad night for "astro," and whilst there was not a great deal of low and medium cloud, a heavy cover of cirro stratus covered the sky for most of our flight. However, our upper-wind forecast proved to be reasonably correct, and our flight plan was adequate.

We got a "loop" check on the radio range at Fernando do Noronha, a small island some 210 miles east of Brazil, and it wasn't long before the city lights of Natal appeared on the horizon. Parnamirim Airport, just outside Natal, was also built by the Americans and consists of two concrete runways, one being 140 deg-320 deg and the other 160 deg-340 deg. As might be expected, the prevailing wind is south-easterly.

The approach speed of the Lincoln is about 100-105 knots, the same as that of the Lancaster, and at this speed there is ample time to get the tail well down before the stall. The only adverse comment about an otherwise faultless aircraft, for landing purposes, is the bad forward visibility which results from the abnormally long nose rising up as the tail sinks down. It makes one pine for a tricycle undercarriage. The single landing light compares unfavourably with the American twin system, but perhaps this is not too important with a night bomber.

We checked-in with the doctor at Parnamirim, who took our temperatures after having sealed us up in the Lincoln for ten minutes while a D.D.T. Aerosol bomb exhausted itself, and passed us as free from malaria. Then, in the best Hollywood tradition, we passed through the various formalities to the accompaniment of rumba music from a nearby radio.

Next we found that no meteorological service, in the normal sense of the word, existed. All route-forecasts for Brazil have to be radioed through from Rio de Janeiro, and since, even at this advanced age, radio is by no means infallible, delays are inevitable. In our case no forecast had arrived, and although I was fortunate enough to borrow one from a K.L.M. pilot who had just arrived from Rio, the officials said we must wait for our forecast to arrive.

Some time later, a rather disgruntled crew climbed back in a Lincoln, and before long we were airborne for Rio. The weather was bad, as it often is along the east coast of Brazil, and we flew through heavy rain and frequent thunderstorms, until a faint light to port indicated a break in the weather and the morning twilight.

Rio was a beautiful sight in the early morning sunshine, and it is undoubtedly one of the finest sights in the world to be seen from an aircraft.

We landed at Galeao, a naval base on Governess Island, at 06.30 local time on a Sunday morning, to find almost everyone still asleep. By this time we were rather tired also, so I for one lay down under the wing of a nearby Ventura and slept for an hour until the refuelling team arrived.

At Rio we were destined to be unlucky. First of all we had radio trouble, and then, when I was taxying the aircraft, I suddenly noticed a lot of people running towards the tail. To get a better view of what was happening, I swung the tail round and found to my horror, and then to my great amusement, that a 22-seater dinghy, normally stowed in the wing, had burst out of its hold, inflated itself and was now calmly sitting on the tarmac with its oars, drogues, axes, food containers and all its other ancillary equipment neatly laid out inside it. The sight of this enormous egg emerging from our wing was a sight that simply amazed the Brazilians. After this episode we thought we'd pack up for the day, as frontal conditions were forecast over Buenos Aires. So we enjoyed a comfortable bed and a fat steak in the Hotel Cerrador.

On the Monday we set off again, ploughed through a wet front, and found ourselves over the Argentine pampas. In due course the River Plate came up on schedule, and were forecast over Buenos Aires

We landed at Moron Airport, which was packed with a large assortment of aircraft, and parked ourselves by some other Lincolns. It had taken us 36 hours' flying time from London, but here was the warm sun of early summer, and the flowers were already in bloom.

Next morning at 7 o'clock we were at the airport, and two days later we arrived back in London by B.S.A.A. York. It was still foggy.

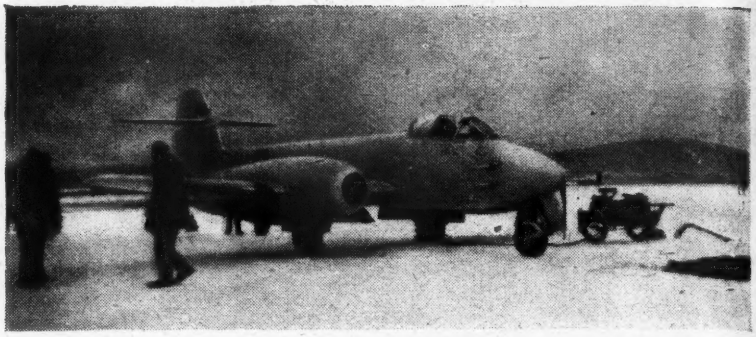
S.G.C. YEAR BOOK

ONE frequently hears old stagers in the aircraft industry long for the good old days. This does not infer a desire to return to outmoded aircraft but rather to the wonderful spirit of comradeship which pervaded flying meetings and competitions in the early days of aviation.

This spirit is recaptured in the stories as narrated by members of the Surrey and Imperial College Gliding in their year book for 1947-48.

All the accounts of soaring flights are very readable, and there is also a wealth of glider information included. The edition is strictly limited to 400 copies. It may be had, price 5s, from the Surrey Gliding Club, Redhill Airfield, Surrey.

HERE AND THERE



YUKON TERRITORY: A Gloster Meteor IV (two Rolls-Royce Derwent V) undergoing winterization trials at Watson Lake, 2,245ft above sea level and surrounded by the thickly wooded Rockies. Daily temperatures averaged—20 deg C.

U.F.S. Cease Charter Work

THE Board of Universal Flying Services, Ltd., have decided to discontinue charter operations. Mr. T. Rose, former general manager of U.F.S., Ltd., has joined Boyes, Segrave and Co. of 69, Piccadilly, W.1, where he is now dealing with aircraft sales and charters and is available in a consultative capacity on any matter connected with flying.

T.E.A. Cancellations

SANDRINGHAM flying-boats belonging to Tasman Empire Airways on the Sydney-Auckland route have been grounded for modification to the engines. The trouble is reported to have been in connection with over-heating of cylinder heads contributed to by abnormally hot weather. It is expected that the modification may take three weeks and T.E.A. are arranging to use Skymasters on this route chartered from Trans Australia Airlines.

New Metalastik Data

METALASTIK, LTD., have published, in addition to their production *Technical Information*, a loose-leaf booklet giving in concise form data relating to the various types of Metalastik rubber-to-metal weld bushes, including dimensions and characteristics for each design, together with suggestions for their use in different applications. The brochure contains, besides dimension and load tables, some excellent diagrams and illustrations of the firm's products and their uses; the task of keeping it abreast of the latest information will be greatly facilitated by the fact that it is in loose-leaf form.

"Die Fledermaus"

FOR many years, both in London and in Derby, the Alan Turner Opera Company, a section of Ernest Turner Group Welfare, has produced a series of Johann Strauss operetta. This year the company is giving "Die Fledermaus" for one week, beginning February 23rd, at the Grand Theatre, Derby. The company has raised over £2,500 for charity, and again this year all profits will be given to local charities, including the Mayor's War Memorial Fund.

Flying Doctor

QANTAS pilot on "Flying Doctor" service in Queensland recently assisted at an urgent operation on a native woman with a ruptured appendix at Mornington Island. The operation was performed at night on a table in the Mission House and was completely successful; a weather official acted as anæsthetist, and the pilot as "assistant surgeon." Paying tribute to both men, the doctor said that, with the aid of a short talk and a few written instructions given to them before the operation, they formed an excellent surgical team.

STORMY WEATHER: Three M.C.A. employees at London Airport do their best to keep out the icy winds.

Technical Controller Resigns

AIR VICE-MARSHAL SIR CONRAD COLLIER has resigned his appointment as Controller of Technical and Operational Services in the Ministry of Civil Aviation. His resignation is to take effect from March 16th. Sir Conrad has not commented on his resignation, neither can he do so at present as he is still working for the M.C.A. He began his career in the 1914-18 war with the Army and transferred to the Royal Flying Corps in 1915. His appointments with the R.A.F. include those of Air Attaché in Moscow, Director of Intelligence at the Air Ministry, Administrative Air Officer in India, and Air Officer Commanding No. 3 Bomber Group.

Sir R. Fairey Honoured

THE United States Medal of Freedom with Silver Palm has been presented to Sir Richard Fairey. The award was made at Kindley Field air base, Bermuda, in recognition of Sir Richard's co-operation with the U.S. War Department, which contributed to the planning of U.S. aircraft research and development, while he was Director-General of the British Air Commission in Washington during the war. Col. Thomas D. Ferguson, the commanding officer of Kindley Field, made the presentation for the U.S. War Department.

King Aircraft Corp.

LAST week we reported that the King Aircraft Corporation of Renfrew had decided to go into voluntary liquidation. Since then it has been decided, at meetings of members and creditors, that as the company is in a position to pay all its creditors in full within four weeks, it should not go into liquidation. The policy will now be to concentrate on the development and supply of components for the aircraft industry, and work will proceed in the No. 2 factory.

Riding on Air

SIXTY years ago, on February 28th, 1888, John Dunlop rode off on a moonlight evening on the first pneumatic tyres. It is very much to be doubted whether even the enthusiastic inventor could have foreseen to what degree his brainchild was destined to smooth the path of travellers, nor could be have imagined the size to which tyres for aircraft would grow, or the need for the "Ecta" electrically conducting, twin-contacting, anti-shimmy tyre, let alone tyres designed to stand loads at maximum deflection of up to 160,000 pounds. It is difficult to imagine where we would have been without pneumatic tyres.

Export Showrooms

INTERNATIONAL BUSINESS SERVICES, LTD., will open showrooms in March which will form the nucleus of a permanent export exhibition, at 14,

Arlington Street, Piccadilly, W.1. I.B.S. was established as a London Headquarters for overseas buyers providing for their clients: Offices, secretaries, interpreters, library, postal facilities and refreshments, in fact, the equivalent of their own offices, secretaries and clubs, in the heart of London. The new showrooms will provide a means whereby British manufacturers may bring their products to the notice of foreign buyers who frequently have insufficient time at their disposal to make extensive journeys outside London. Although I.B.S. is not an agency and therefore orders for goods cannot be accepted, any interested foreign buyer is immediately put in touch by telephone with the exhibitor whose products he wishes to discuss.

Mosaic Map of Toronto

A MOSAIC picture of the whole city of Toronto is being made by the Photographic Survey Co., Ltd., a Canadian company of the Hunting Group, for the Toronto City Planning Board. This project was begun last April when two Anson aircraft, flying on parallel courses over the city, took several hundreds of vertical photographs which, when cut and pieced together will form a map of 529 sq ft area. The scale is to be 1 inch to 400 feet, and the estimated cost of the map, depicting an area of about 250 square miles, is in the neighbourhood of $10,000.

Airport Engineer Resigns

MR. J. G. COLQUHOUN, until recently chief resident engineer of London Airport, has resigned his appointment and travelled by air to Kenya with his family to become technical director of a contracting development organization there. Before leaving this country Mr. Colquhoun said he was going to start a new life in Kenya because restrictions on civil engineering were so great in England. Had London airport development proceeded according to the original plan he would have remained. He thought that civil engineering in this country had a great future if matters were handled correctly but he could not wait.

HOPPI-COPTER DEVELOPMENT: At present three are being tested for the U.S. Army Air Force. Pilots' reports are promising. A small production (10) is likely to be started soon for civil demonstration use and C.A.A. approval.

A D.H.89 with a History

AMONG a number of D.H. Rapide aircraft to be sold at the end of their service with B.E.A. is one which had an exciting history when France capitulated to the Germans in 1940. This machine, G-AFOI colloquially known as "OI," was used to fly three Government agents to Bordeaux to fetch some secret blue-prints of a new industrial process before these fell into enemy hands. Piloted by Captain Donald Prentice, the mission was barely completed in time, and after leaving Bordeaux a stop was made at Jersey to refuel, after which engine failure forced them to return to Jersey for repairs. Mr. J. Hawes, the engineer of the Rapide, worked all night with only a hacksaw, screwdriver and a hammer, and after a masterpiece of improvisation had been completed with adhesive tape and locking wire, the aircraft reached Britain safely with its important cargo. The front bulkhead carries a war-service plaque.

News in Brief

Passenger and troop-carrying aircraft of the R.A.F. flew 11,200,000 miles in December with only one accident, involving injuries to three men.

* * *

The Saharanpur Civil Aviation Training Centre, which has during the past year trained more than 350 pupils in radio communications and radar, plans to expand the school to include ground engineering, flying and flying-control training. Trainees are chosen by a Selection Board assisted by university authorities.

B.O.A.C. will introduce a new service this week connecting Ceylon and Singapore. Lancastrian aircraft converted to carry 13 passengers, mail and cargo, will operate this service once a week and are expected to complete the journey, non-stop, in about eight hours.

* * *

The Dunlop Brotherhood Cup, an antique silver tureen, was presented in Melbourne to Sir Alexander Stewart, the chairman of the Australian branch of Dunlops, by Sir George Beharell, the British chairman, to mark the generosity of the employees in the Australian branch in sending to Dunlop employees in Britain 31,500 food parcels, costing close on £20,000.

* * *

L.A.M.S., the company directed by Dr. Graham Humby, which recently opened its Australian branch, has recently flown a cargo of fish from New Zealand to Sydney; the fish arrived the day after being caught and the cargo weighed 5½ tons. On the return journey 6 tons of pineapples were carried. This experiment may lead to daily flights being undertaken to carry perishable cargoes between Australia and New Zealand.

* * *

When the B.O.A.C. Constellation *Bangor II* left New York in January over half a ton of fountain pens were on board for transportation to a destination in Pakistan. They arrived at London Airport on the next afternoon and early the following morning were in a York on their way to the East. At nine o'clock on the next evening they arrived at Karachi after travelling 8,530 miles in under three days.

The same journey by fast passenger boat, allowing only two days for transshipment in the U.K., would take four or five weeks.

THE R.A.F. IN GERMANY: A flight of the R.A.F. Regiment having an hour's break for lunch in a wood. There are plenty of opportunities for sports in the B.A.F.O. and in off-duty hours units usually turn out teams for football, hockey, cricket and squash, and there are ample opportunities for skiing and other winter sports.

"Flight" photograph.

The Chancellor of the Exchequer opens the new college. Seated (L to R) Mr. H. L. Stevens, Mr. W. G. A. Perring, Sir Archibald Rowlands, and Mr. R. D. Peggs.

Technical Training at Farnborough

Opening of R.A.E. Technical College by Sir Stafford Cripps

ALTHOUGH the technical training of youngsters at the R.A.E. has been of prime interest since 1918, it is only quite recently that it has been possible to instal this specialized education in a building of its own and thus to justify the title of Technical College. During the war years it was felt that a much larger teaching and training function should be associated with an establishment covering such a wide field of research and development as the R.A.E. A Principal of considerable experience in the field of technical education was first appointed to take charge of the work, and a staff of well-qualified lecturers was built up. The senior scientific and technical staff of the Establishment gladly assisted by serving on one or other of the committees set up to guide the work of the College in relation to the known requirements of the research departments.

The present scheme, which is roughly four years old, caters for Engineering Apprentices, Craft Apprentices, Scientific Assistants, Drawing Office Tracers and Junior Clerks. Engineering Apprentices are admitted after open competitive examinations, aptitude tests and interview. The standard of examination is approximately between General School Certificate and Higher School Certificate.

In his introductory speech, prior to declaring the College open, Sir Stafford Cripps said that as Minister of Aircraft Production he had learnt not only the amount but the value of the work done at the Royal Aircraft Establishment, and as an adjunct to that, realized the immense importance to the country of training young persons for the aeronautical industry. For the full development of the science of aeronautics, it had become necessary to consider an extended scheme of training, and the R.A.E. was the ideal place for such training. Not only were the very latest developments in aeronautical science the subject of study at the Establishment, but it was peopled with a staff as highly qualified as was to be found anywhere in the world. Sir Stafford also expressed the hope that the change in the location of the College (an ex-convent) would not entail the spiritual value of the education given there to be wholly displaced by material values. For, however great the importance of the material side of our lives, we should starve ourselves of all happiness if we neglected the things of the spirit.

During the first year of the five-year course, Engineering Apprentices are sorted into two groups, one of which goes forward for the R.A.E. Diploma and is expected to obtain the London Degree in Engineering at the end of the fourth year, while the other proceeds to Higher National Certificates in Mechanical and Production Engineering. Both of these groups spend their first years wholly in the College, sharing their time between the drawing office, training shop, lecture rooms and laboratories. Their second and third years are spent in the various workshops of the Establishment, and their fourth and fifth years in the research departments and drawing offices. In these last years, there is a divergence in training in that the Diploma group is guided towards work in the research departments while the National Certificate group goes towards design and development in the workshops and drawing offices.

The second main group, the Craft Apprentices, also enter by competition but without a written examination. These entrants are intended primarily for craft work in the shops and, in some cases, for supervisory work. Their course of training also extends over five years, although only the most promising pursue a course of study in the fourth and fifth years. The first year of the course is spent, as in the case of the Engineering Apprentices, in the College workshops, drawing office and lecture rooms. Subsequently, the apprentices receive general training in a number of crafts and spend the last two years wholly on the crafts of their choice. Concurrently with the shop training, the class-room instruction leads to the appropriate City and Guilds Certificates, which the best apprentices carry to the final stage.

Living Conditions

All apprentices receive wages throughout the period of training, and for those living away from home a substantial subsistence allowance is paid. The majority of these live in the hostel associated with the Establishment, where several blocks are set aside for their exclusive use, and they are in the charge of a resident master who is also a lecturer in the College.

Scientific Assistants are junior staff employed in the research departments of the R.A.E., and to be accepted for employment, must have obtained a General School Certificate in appropriate subjects. They are given a four months' full-time course of training in the College on the techniques of experimentation, the use and care of various hand tools, the making and reading of simple drawings, and the appreciation of the methods of operation and uses of all kinds of measuring equipment. Following this course, they are allocated to departments in accordance with their natural aptitudes and the demands of the Establishment, but continue attendance at the College for three half-days

per week, which attendance may be extended for four years. At the end of the second year the students may enter for the London Intermediate Degree of Science. Those finishing the four-year course take the examinations for the R.A.E. Certificate, which carries exemption from the examination requirements for the Associate Fellowship of the Royal Aeronautical Society.

All junior employees of the Establishment, not counting apprentices, attend classes on the lines of a county college, in which they are taught some vocational subjects, such as mathematics, but in which they also study current affairs, industrial history and general cultural subjects.

Throughout the period of re-organization a very determined attempt has been made to foster a strong corporate spirit in the College, and there is now a flourishing Students' Union which caters for sporting and social activities.

In introducing Sir Stafford Cripps to the assembled company of students and guests, the Principal of the College, Mr. R. D. Peggs, M.A., M.I.Mech.E., emphasized that, in re-organizing the basis of the education provided, three main objectives had been kept in mind. First, to give a complete and systematic scientific training; secondly, to provide the best practical training in their chosen craft for those students who exhibited the potential capabilities of highly skilled craftsmen; and, thirdly, to fit all students for life with a high sense of their purpose as citizens. The Principal also emphasized that the Technical College existed to provide the fundamentals of a general scientific education and, to this end, specialization did not begin until almost the last year of any course. Sir Stafford then presented the prizes and certificates for the year 1946-47.

The College building was not acquired until the middle of 1946 and then had to be adapted for its new purpose. This has been done extremely well and, although there are in short supply various items of equipment which have yet to be installed, it is expected that these will be obtained before long. Nevertheless, the College is very well equipped in its several laboratories, these being arranged on the ground and first floors, with offices and lecture rooms on the first and second floors and the third floor given over to staff study rooms and the students' recreation room. The Structures Laboratory, Aerodynamics Laboratory and Chemistry Laboratories are in an out-building, whilst the Heat Engines and Steam Engine Laboratories are in the basement, together with the boiler room and fuel store.

The building which now houses the R.A.E. Technical College. "*Flight*" *photograph.*

Statement Relating to Defence

Man-power, Research and Equipment : Supersonic Military Aircraft

THE second Statement Relating to Defence issued since the establishment of the Ministry of Defence is made under three main headings: Requirements in 1948; Developments in Defence Organization; and The Future. Under the first heading, the uniformed man-power of the R.A.F. is given as 261,000 as at April 1st, 1948, and 226,000 at March 31st, 1949. It is intended that the campaign to encourage voluntary recruiting in the Regular Forces should continue and the highest importance is attached to its success. At the same time, it has been found necessary to restrict the intake of National Servicemen and the call-up in 1948 will accordingly be retarded.

Re-equipment in certain important fields, particularly in respect of aircraft for the R.A.F. and the Naval Air Arm, will be continued at a somewhat reduced rate, and stocks remaining from the war will continue to be used to the limit. The Air Ministry programme provides for a further measure of rearmament of fighter squadrons with jet-propelled aircraft and for a limited measure of re-equipment in other fields.

Reference is made to the high proportion of the total expenditure devoted to general aeronautical research and to the development of aircraft with improved characteristics of speed, range and carrying power. The problems of high-speed flight are receiving much attention, and the policy is to study them not only by means of wind-tunnel experiments, but also by flight trials of research aircraft, both piloted and pilotless. There can be little doubt, it is stated, that it will eventually be possible to produce operationally effective military aircraft capable of flying above the speed of sound. Work continues also on the development of aero engines, mainly in the form of gas turbines, in which field this country has long held a leading place.

It is provisionally stated that the existence of weapons of mass destruction increases the possibilities of surprise attack, since the effort required to deliver devastating attacks will be smaller than that demanded by the use of conventional weapons. Decisive results might even be obtained by their use alone.

To avoid wasteful dispersion of effort, research and development activity for all three Services must be directed as far as possible to those projects which, in the long run, are expected to have the greatest effect upon the future conduct of war. In furtherance of the policy of concentrating on essentials, the Government has decided upon the following principles: The Royal Air Force must be maintained at a level sufficient to preserve its essential structure and its initial striking power. The Royal Navy, with its Air Arm, must be enabled to perform its vital role in the control of sea communications and to execute such tasks overseas as are laid upon it. The Army must be in a position to meet its overseas commitments and to provide the organization needed for training its National Service intake.

No possibility is foreseen that the R.A.F. will be able to meet its commitments without supplementing its regular strength by National Servicemen, and the need for a trained Reserve for all three Services, capable of immediate mobilization, remains a basic requirement.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

SOUVENIRS OF SERVICE

Uniforms, etc. Wanted for "Museum"

I AM at the moment commanding a Recruits Training Wing and am trying to get together some exhibits to start what I am calling a "Museum." The object is to endeavour to interest the recruit from the outset of his R.A.F. career in the traditions of the Service.

I feel that much can be done towards this aim by showing him, amongst others, battle honours; souvenirs of the battle-fields; photos of the effect of bombing; types of aircraft, old and new; and lastly, uniforms worn by the R.F.C. and R.A.F. from its inception, together with those of the German and Jap.

It is regarding the last-named equipment that I am writing to you in the hope that you will be good enough to print my letter in your magazine, and that by so doing, some reader might be prompted kindly to loan such uniforms as I have mentioned for my museum.

I can guarantee that the greatest care would be taken of them, and moreover any other souvenirs which it is thought would help towards attaining the aim I am seeking, and for which I would be most grateful. J. W. MARTIN, W/C.

No. 1 Recruits Training Wing,
R.A.F. Station,
Padgate.

FLUIDS FOR T.K.S. DE-ICING

Satisfactory Distribution Dependent on Creep

IN your issue of January 22nd we see that Messrs. E. L. Bass and Maxwell Smith consider our note (*Flight*, December 18th) on the use of only T.K.S. fluids in the T.K.S. system to be misleading.

We will agree that the essential thing to an airline operator is whether or not the fluid has received the Air Registration Board's approval. In this case, the approval of D.T.D.406A arose out of rather unusual circumstances, caused by the withdrawal of H.70 in July, 1947. Owing to the fact that no new fluid was at that time available, D.T.D.406A was the only de-icing medium obtainable. As aircraft had to continue to operate, the only possible action was to give it temporary approval.

When R.328 became available and was given approval, the Air Registration Board approved the use of both fluids, probably feeling that with the present supply situation the availability of two products, even if one was not as efficient as the other, was the wisest course of action.

To assume, however, that a fluid which is satisfactory for use with the fabric wick and overshoe type of distributor must also be satisfactory for use with the T.K.S. system is entirely incorrect. The fabric wick type depends largely on its overshoe to help distribute the fluid evenly and to feed it to the stagnation area. As the T.K.S. system has no such assistance, satisfactory distribution from the porous metal distributors is dependent on an even flow from the distributor and the power of the fluid itself to flatten-out and not flow away in rivulets.

Further—and this is the most important point and the main reasons why only T.K.S. fluid should be used on T.K.S. systems—there is no pad over the stagnation area, and the system is dependent on characteristics inherent in the fluids to de-ice this area.

Where there are two distributors, the stagnation point lies between them. The flow from the upper distributor will be carried by the airstream over the top of the aerofoil and that of the lower beneath it. Thus there is no actual flow, in the usual sense, between the two distributors, and the de-icing of this area is entirely dependent on the creep of the fluid from the distributors.

That the T.K.S. fluid will do this and give satisfactory operation was shown in the Viking flight de-icing tests last winter, on both the tail and main planes. The official report says of the tailplane: "Slight formation between the double element but will not build up"; and for the mainplane: "Small deposits occasionally between elements but will not build up."

It is agreed that we have no definite proof that D.T.D.406A would not have done the same, but it contains none of the characteristics that would be expected to enable it to do so. It is for this reason that Messrs. T.K.S. cannot agree that D.T.D.406A is as efficient a fluid for use on the T.K.S. system as their own fluids specially designed to meet the particular need. T.K.S. (AIRCRAFT DE-ICING), LTD.

London, W.C.1.

STUDYING THE PASSENGER

B.O.A.C. Taken to Task

I READ Mr. Van Leer's letter regarding British airlines with complete agreement (issue of Jan. 1st, '48). In order to get and hold foreign customers, B.O.A.C. will have to realize that from the viewpoint of western hemisphere customers, speed comes before safety considerations. I look at the operating time schedule not at the company's annual casualty list when booking an air trip. Stewardesses must be attractive and attractively dressed, not attired in a vaguely military ensemble with austerity cotton legwear.

Meals must be free, and if a passenger wants a glass of milk or some chocolate at odd moments, he must receive it without a chilling glance from the donor. Finally the pilot doesn't need to say "hello" to the passengers; his job is to fly the plane, not to waste everyone's time exhibiting an interest which he probably doesn't feel and which is seldom reciprocated.

Also, that old "No Smoking" ban, on European B.O.A.C. trips; it's high time that the Corporation woke up and realized that people like to smoke in a plane—any curtailment of what they regard as their rights merely drives them into another company's aircraft. American Airlines make you feel you're welcome. At Cleveland recently, when engine trouble downed a DC6, the company stood us all free meals and arranged other connecting flights for passengers in an urgent hurry.

Until B.O.A.C. provide flight schedules *as fast as any*, really attentive service and high-speed surface transportation, the British taxpayer will continue to foot the annual deficit. There are the finest engineering brains in the world located in the British aircraft industry. Why not cut the Government's red tape and airy talk of "that type should be in service around 1950 or so" and let the people that know the job go ahead with it?

At the moment, bureaucracy and a plethora of "Ministries" seem to be holding up the construction of the aircraft needed. Meanwhile, unhampered, the U.S. constructors go ahead, and beat British products simply because they can go ahead with the job unfettered by Government "Control."

As soon as the customer is given the impression by B.O.A.C. that he is welcome, and that they are really alert, there should be little difficulty in gaining the required foreign exchange. But at the moment the overseas customer has the feeling that he is just being dealt with by a Government Department, and believe me we don't like it!

With all best wishes for your magazine, which is still the finest aeronautical journal in the world. G. D. HART.

Quebec, Canada.

FORTHCOMING EVENTS

Feb. 26th.—Royal Aeronautical Society: "Evolution of the Design of an Aeroplane." Prof. R. L. Lickley, B.Sc., D.I.C., F.R.Ae.S.
Feb. 26th.—R.Ae.S. (Manchester): "Naval Aircraft." Capt. Fancourt, R.N.
Mar. 3rd.—R.Ae.S. (Bristol): Prize-winning Papers by Junior Members.
Mar. 3rd.—R.Ae.S. (Southampton): "A Survey of Fighter Handling Qualities 1936-1948." J. K. Quill, O.B.E., A.F.C.
Mar. 4th.—R.Ae.S. (Gloucester and Cheltenham): "Castings and Forgings." A film introduced by C. F. Ingram.
Mar. 10th.—R.Ae.S. (Preston): "Bird Flight." Capt. J. L. Pritchard, Hon. F.R.Ae.S.
Mar. 10th.—Royal United Service Institution: "Progress in Aircraft Design," B. N. Wallis, C.B.E., F.R.S.
Mar. 11th.—R.Ae.S. (Yeovil): Lecture by P. G. Masefield, M.A., F.R.Ae.S.
Mar. 12th.—Institute of Navigation: "Air Sextants. F. F. Everitt, B.Sc.
Mar. 16th.—R.Ae.S. (Belfast): "Inside Occupied Japan" W. Courtenay, M.M., A.R.Ae.S.
Mar. 18th.—Royal Aeronautical Society: "Flight Testing at High Subsonic Speeds." H. Davies, B.A., M.Sc., A.F.R.Ae.S.
Mar. 20th.—Society of Licensed Aircraft Engineers: "Brains Trust," in co-operation with the N.C.A. and A.R.B. Question Master, R. H. Hardingham, O.B.E.
Mar. 22nd.—R.Ae.S. (Bristol): "Operation of Civil Transport Aircraft." N. E. Rowe, C.B.E., F.R.Ae.S.
Mar. 25th.—R.Ae.S. (Yeovil): "Recent Developments in Flying-Boats." H. Knowler, F.R.Ae.S.

SERVICE AVIATION

GOOD NEIGHBOURS : A Fairey Operational Trainer (Rolls-Royce Griffon) of the Royal Netherlands Navy (nearer camera) in formation with a similar aircraft for British Naval Aviation. Note that the British machine has a lower canopy over the front cockpit.

Transport Inspection

AIR MARSHAL SIR BRIAN BAKER, K.B.E., D.S.O., C.B., M.C., A.F.C., Air Officer Commanding-in-Chief, R.A.F. Transport Command, left England on February 15th to inspect the trunk route to Middle East and Far East in his capacity of Inspector of the Air Transport Services of the Royal Air Force. He was accompanied by specialist staff officers and is using the normal trunk route facilities for the round trip of 18,090 miles.

As Inspector of Air Transport Services, the C.-in-C. Transport Command helps to establish common standards and procedures in air transport throughout the Service by advising overseas Commanders-in-Chief on Air Ministry policy covering transport—support, ferrying, reinforcement routes, new equipment and methods, training and other matters. Periodic visits to Overseas Commands are made to ensure that uniform standards are being maintained.

V.R. and A.T.C. Flying Times

R.A.F. Volunteer Reserve and W.A.A.F./V.R. (Flying) List pilots and their instructors have flown approximately 19,000 hours on training flights, including night flying, at the 14 Reserve Flying Schools since these first opened last April. Of this total about 3,200 hours represent flights given to some 8,400 A.T.C. cadets by R.A.F.V.R. instructors during week-ends or annual camps.

At the two schools in the London area (Panshanger and Fairoaks) a total of 5,595 flying hours was reached in eight months by the V.R. pilots and 3,101 cadets were given 1,176 hours' flying as passengers. At the remaining twelve schools the pilots flew for 9,905 hours in periods varying from three to ten months, according to the dates the various units opened, and 5,309 cadets flew some 2,024 hours as passengers.

The greatest number of cadets was flown at Fairoaks, which gave flights to 1,971. Panshanger with 3,042 hours in eight months was top in the number of hours flown by V.R. pilots although Woodley, considering its relatively small strength, was a close runner-up, coming second, with 2,645 hours in ten months. Castle Bromwich's total of 100 V.R. flying hours, and that for Hamble of 809 hours were reached in comparatively short periods; these schools only having been open for recruiting for three months, and for five and a half months, respectively.

Royal Air Force and Naval Aviation News and Announcements

A.O.C. No. 63 Group

AIR COMMODORE G. H. VASSE, C.B.E., Air Officer Commanding No. 25 Group, Flying Training Command, will take up a new appointment on March 22nd as A.O.C. No. 63 (Western and Welsh Reserve) Group, Reserve Command, with headquarters at Hawarden. He took up his present appointment on May 1st, 1947, after returning from the Far East, where he had been since early in 1944, first as Deputy Senior Air Staff Officer at headquarters of Air Command, South East Asia, later as Deputy Senior Air Staff Officer of No. 221 group, 3rd Tactical Air Force, and afterwards as Commander of the Royal Air Force station at Seletar, to which he went in March, 1946, after six months at Air Headquarters, Burma.

R.A.F. Rugby Union

W/C. G. R. Howie, D.S.O., has recently taken over the honorary secretaryship of the R.A.F. Rugby Union. He was in the rugby team at Wellington School, Somerset, and later, while he was a private in the London Scottish, played for the London Scottish "A" team. After being commissioned in the R.A.F. in 1932 he continued to play and in 1937 he was in the R.A.F. Middle East side.

"V.R." and "Aux." Badges

MEMBERS of the R.A.F. Volunteer Reserve and the Royal Auxiliary Air Force are to be issued with pre-war silver lapel badges from existing stocks to wear with their civilian clothes. The badge consists of a circle, about a half-inch in diameter, enclosing the letters "R.A.F.V.R." or "A.A.F.," with an eagle at the base and surmounted by a crown. A new design for the Auxiliaries —taking account of its prefix "Royal" —may be considered later.

W.R.A.F.

ALTHOUGH the new title of the W.A.A.F. has now been announced as the "Women's Royal Air Force" (short title "W.R.A.F.") the old title will continue to be used until the women's regular service is formed and the present service is no longer regarded as an auxiliary service. Women completing their present W.A.A.F. engagements will continue to be known as "W.A.A.F." The new title embodies the principle (of which the women's service is justly proud) that they are an integral

Service Aviation . . . . .

part of the Royal Air Force, and not one of its auxiliaries.

Other branches of the women's service will be the Women's Royal Air Force Reserve of Officers, the Women's Royal Air Force Reserve, the Women's Royal Air Force Volunteer Reserve, the Women's Royal Auxiliary Air Force, and the Women's Royal Auxiliary Air Force Reserve.

Escaping Society

THE R.A.F. Escaping Society offices are now at No. 83, Portland Place, London, W.1. Telephone: Welbeck 1156, extension 24.

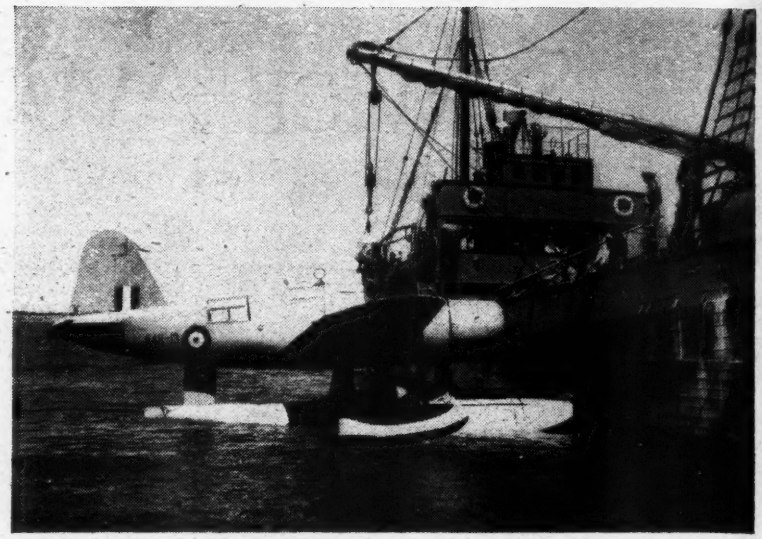
Electrical Quarterly

THE first issue of the Electrical Officers' Association (R.A.F.) Quarterly *Bulletin* contains an inaugural address by Group Captain C. C. Bazell, A.M.I.E.E., the President of the Association, which was formed in 1946. Electrical officers will find an abundance of news and technical information in its 23 pages. The Editor is S/L. E. Armistead, 33, The Drive, Adel, Leeds, 6, Yorks.

W.A.A.F. Overseas Inspection

THE Director of the Women's Auxiliary Air Force, Air Commandant F. H. Hanbury, M.B.E., is making an inspection of all R.A.F. stations in the Middle East and Far East on which W.A.A.F. personnel are serving. The purpose of her visit is to assure herself that conditions on these overseas stations are suitable in every respect for women, and that adequate facilities for recreation and leave exist when the W.A.A.F. overseas posting policy is brought into line with that of the Royal Air Force.

This will be the Air Commandant's first visit to Singapore and the Far East, but many of the stations in the Middle East will be familiar to her. The Director was Senior W.A.A.F. Staff Officer in the Middle East in 1945 and 1946, when in nine months she put in 300 flying hours to visit the 3,500 officers and airwomen, then in Middle East.



POLAR KINGFISHER: The Kingfisher (genus Chance-Vought) is an uncommon sight these days. Here is one going aboard H.M.A.S. "Wyatt Earp," a vessel used for Antarctic exploration.

Aid from Art

NEARLY £1,500 has been collected for the R.A.F. Benevolent Fund by the sale and exhibition of pictures by noted Brazilian artists. The pictures were donated by the artists in 1943 as a gesture of friendship to Britain. After exhibition in London, they were seen at the Castle Museum, Norwich; the National Gallery, Edinburgh; the Kelvin Grove Art Gallery, Glasgow; the Victoria Art Gallery, Bath; the Bristol Museum and Art Gallery; the Manchester Art Gallery, and the Reading Art Gallery.

MINUS BUTTON, PLUS D.S.O.: When he attended an Investiture at Buckingham Palace recently to receive the D.S.O. for over a hundred bombing operations, F/L. J. C. Cogill wore the new-type officers tunic which has no side pockets, no bottom button and a hacking-jacket type back.

R.A.F. Rugby Union Chairman

A. CDRE. G. R. BEAMISH, C.B., C.B.E., rugby captain and Irish international, has succeeded G/C. G. A. Walker, C.B.E., D.S.O., D.F.C., as chairman of the R.A.F. Rugby Union. A. Cdre. Beamish is Director of Weapons, Air Ministry. Holder of 25 international caps, he has two brothers in the service, and his elder brother, G/C. F. V. Beamish, D.S.O. and Bar, D.F.C., A.F.C., was killed during the war. All four have represented the R.A.F. at Rugby, and one of them has played 12 times for Ireland. During the war the family held a unique record, with four brothers and two sisters in the R.A.F., the latter being women dental officers.

A. Cdre. Beamish is an all-round sportsman. In 1925 he was R.A.F. officers' gold champion, and in 1929 R.A.F. heavyweight boxing champion.

R.A.F. School

THE R.A.F. has set up a School of Education at Wellesbourne Mountford, Warwickshire, to provide courses for education officers and others who may have to perform educational duties. One object of the school is to give specialist training to newly appointed education branch officers, including the adaptation of their professional qualifications to Air Force needs. Courses for this purpose will, to begin with, last four weeks and will cover some aspects of teaching practice, the organization of Air Force education, the part played by education in maintaining high training and morale standards, and the scope of the citizenship and current affairs scheme. The school is also to train members of the Service who may have to help as instructors in citizenship and current affairs under the General Education Scheme.

Reunions

A NO. 19 F.T.S. reunion will take place on Saturday, March 13th, at the Strand Brasserie. Tickets—15s each—from F/O. J. Oliver, R.A.F., Feltwell, Thetford, Norfolk.

HIDDEN TREASURE?

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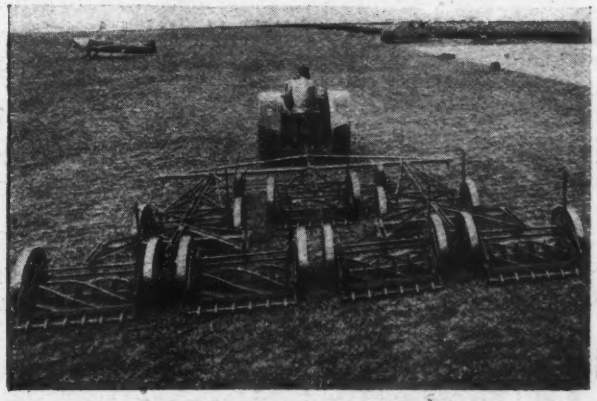

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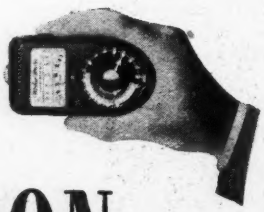

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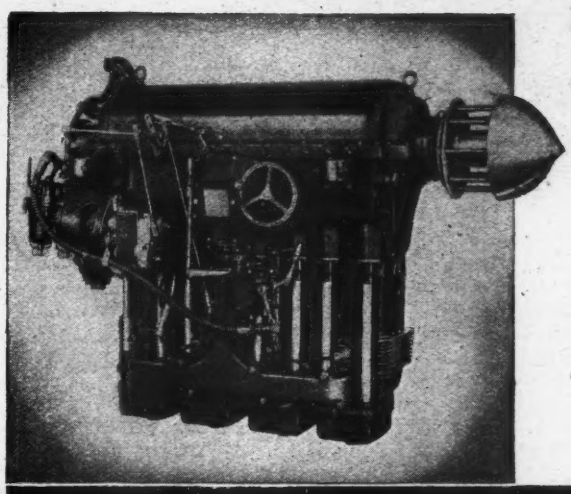

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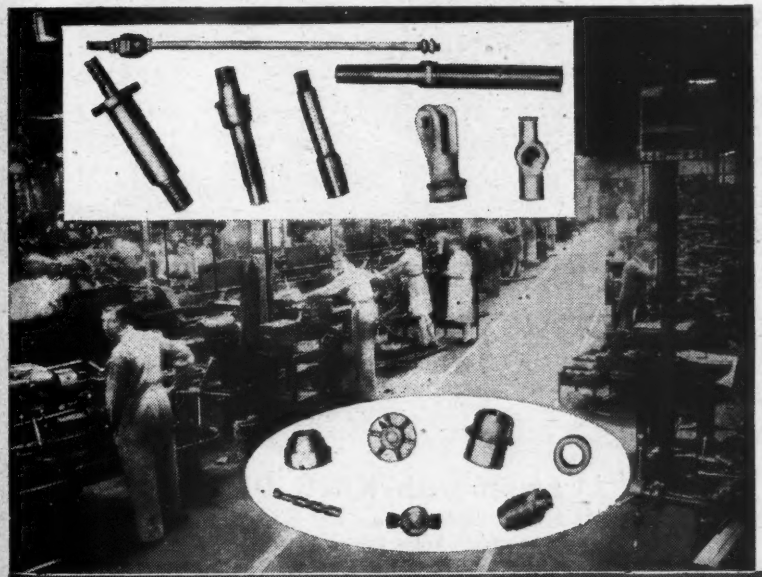

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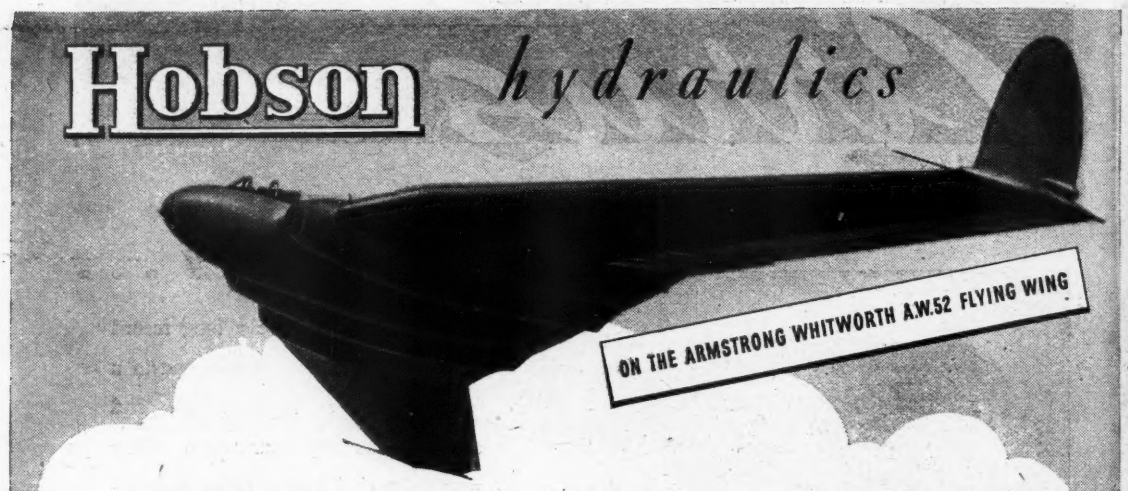

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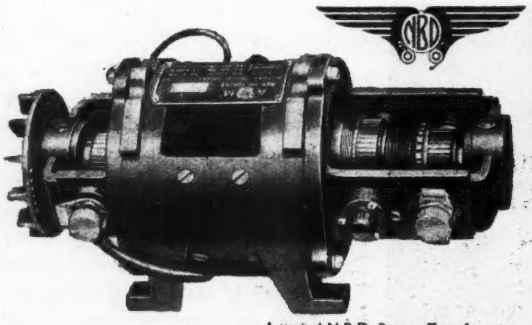

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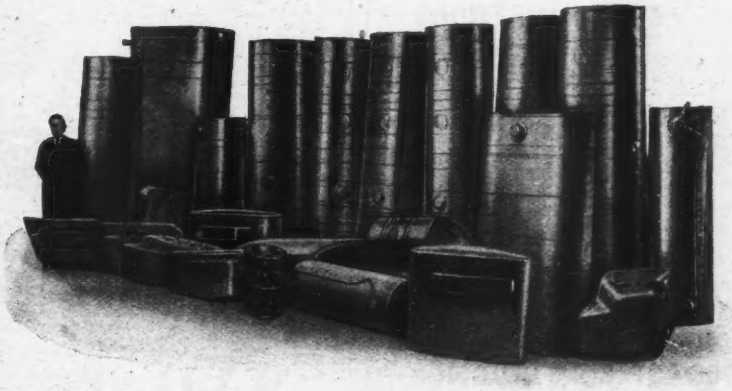

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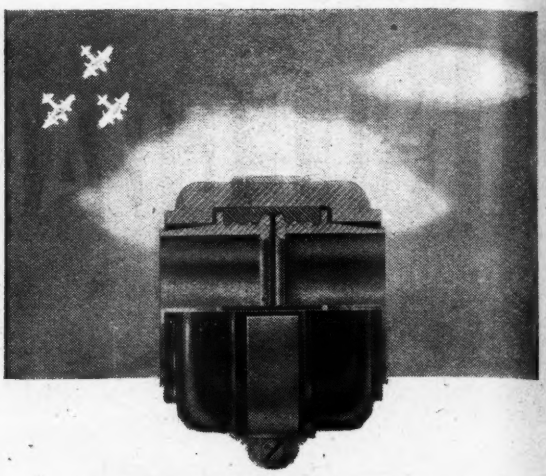

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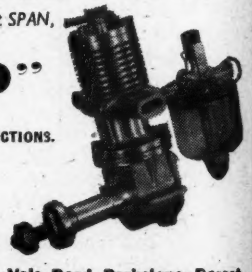

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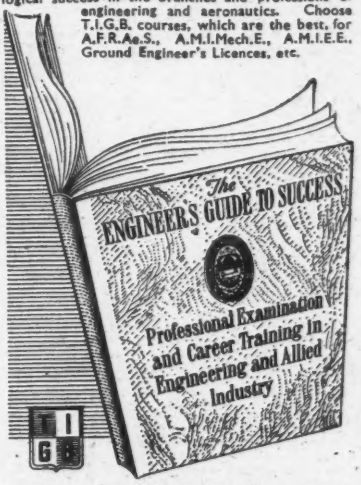
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REPAIRS and C. of A. overhaul for all types of aircraft.—Brooklands Aviation, Ltd., Civil Repair Service, Sywell Aerodrome, Northampton. Tel. Moulton 3251. [0307

NORMAN RANSON (AERELECS), Ltd., for B.T.H. and Rotax aircraft equipment, sales and service; generators, magnetos, starter motors, etc.; Lodge aero plug distributors.—Head Office, Main St., Prestwick, Ayrshire, also Site 74, North Terminal, Renfrew, Airport. [1288

CONTACT Western Airways, Ltd., Weston Airport, Weston-super-Mare, for estimates, C. of A. overhauls, repairs, servicing all types aircraft and gliders; also for air charters and airline travel (we are I.A.T.A. agents for the world).—Tel. Weston-super-Mare 2700. [0815

IMMEDIATE capacity for engine and aircraft overhauls and renewals of C.s of A. on large or small wood or metal aircraft; Halifax and Dakota conversions a speciality; special consideration given to private owners, flying clubs, etc.; estimates free.—C. L. Air Surveys, Ltd., The Airport, Doncaster. Tel. Doncaster 55439. [0365

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R. K. DUNDAS, Ltd.—Aeroplanes, engines, aeronautical equipment and accessories agents at home and abroad for the Aircraft and Allied Industries; branches and agents throughout the world.—Head Office: 4, St. James's St., S.W.1. Tel. Whi. 2848. [0215

BOOKS, ETC.

"FLIGHTS," 1909, 14 assorted copies; 1910 to 1913, complete (unbound); 1919, 23 assorted copies. "Aeros," Nos. 19 to 84, what offers?—Gibson, 16, Walmer Gardens, Ealing, W.13. [1473

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MODERN single-storey factory and offices; freehold; 25,000 sq ft with 40 acres land; 30 miles north of London; £30,000; no agents.—Box 5834. [1445

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MOTOR coaches, 24-hour service, airports, Continental travel, private charter.—Stockland Coaches, Erdington, Birmingham. Tel. Erd. 1189 0703. [0398

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CELLULOSE, auto, industrial flock and stovings, delivery same day; cat. 1d, "Paint Spraying" book, 3/6; samples 1/3.—Leonard Brooks, Harold Wood, Essex. Ingrebourne 2560. [0383

FINEST quality motor cellulose goods and commodities, also spraying equipment, immediate delivery, satisfaction guaranteed; also Nuagane marvellous upholstery leather dye, 30/6 quart tin nett; all colours.—Excel Motor Co., 445, Waterloo Rd., Blackpool. [0364

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REDHILL FLYING CLUB, Redhill Aerodrome, Surrey, for instruction.—Nutfield Ridge 2245-3234.

BREVET FLYING CLUB.—Fully licensed residential club house, excellent food; membership now exceeds 10,000; meet the flying types at the "Brevet"; membership, £1/1 p.a.—Secretary, 11, Chesterfield St., Mayfair, W.1. Gro. 1353. [0392

£2/5 per hour, dual and solo; Wiltshire Flying Club winter rates; A, B, and Instructors' licences; night flying, £5/5 per hour, residence £3/13/6 per week.—Booklet from Thruxton Aerodrome Andover. Hants. Weyhill 352. [0253

DENHAM AERO CLUB.—Fully licensed clubhouse, good food, beautiful swimming pool, 40 min. Paddington Stn.; flying rates from £2/15 dual, £2 solo per hour; average dual to solo six hours; a/c, Piper Cubs, Auster, Proctor, Magister; fly yourself hire and charter.—Tel. Denham 2161. [0409

COWES AERO CLUB.—Flying instruction at £3 per hour (dual and solo) for Moth and Auster aircraft, combine your flying instruction with a holiday by the sea, accommodation and all details arranged; attractive clubhouse offers full social amenities, short-term membership available.—Full details from Secretary, Cowes Airport, Isle of Wight. Tel. Cowes 535. [0004

HERTS and Essex Aero Club, Broxbourne Aerodrome, Nazeing, Essex, 15 miles from centre of London, L.N.E.R. from Liverpool Street, or Green Line Route 715 every 20 minutes from Broadcasting House; flying training in Tiger Moths, Hornet Moths, Austers and Magisters, dual £3/5, solo £3 per hour; instructor's courses air charter and photography; residential clubhouse, restaurant; trial lesson, half an hour in the air with an instructor, 30/-.—Tel. Hoddesdon 2453. [0230

CONSULTANTS

AMERICAN trained stylist in product design; increase your sales through improved appearance.—Consult Douglas Scott M.S.I.A., 100, Gloucester Place, London, W.1 Welbeck 2667. [0381

AS we shall shortly become Members of an Association of Management Consultants whose code of conduct precludes advertising, we shall be discontinuing all Press announcements in the next week or so. SHOULD we at any time change our address or telephone number an announcement to that effect will of course be made.

S. J. NOEL-BROWN & Co., Ltd., 2, Lord North St., Westminster. Tel. Abbey 2126 (5 lines). [0022

EXPERIMENTAL WORK

PROTOTYPES; specialists in experimental work, design and construction of special machinery and electro-mechanical mechanisms.—Research Engineers Ltd., Northampton Grove, Canonbury, London, N.1. Canonbury 4244-5. [0384

FINANCIAL, PARTNERSHIPS, ETC.

DIRECTORSHIPS available for Pilot, B Licence, also General Manager for Airport, Shropshire; investment in each case £2,000; salary £750 p.a. to commence.—County Air Taxis, Ltd., 11, Wyle Cop, Shrewsbury. Phone 4782. [1427

HOTELS AND ACCOMMODATION

ROYAL OAK HOTEL, Keswick-on-Derwentwater, heart of English Lake District, offers restful holiday to Air Force personnel; first-class accommodation at reasonable charges. [0014

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AVIATION insurance, personal accident (flying) policies.—J. W. T. Amey, Messrs. R. J. Moffat & Co., 796, High Rd., Tottenham, N.17. Tottenham 2003-4-5. [0300

MISCELLANEOUS

COMPLETE set astronomical navigation tables for sale, as new, cheap.—3, Sulby Avenue, King's Rd., Stretford, Manchester. [1471

EMBROIDERED badges and crests made to order.—Write Willeringhaus & Co., Ltd., 48, North Side, Streatham Common, London, S.W.16. [0379

HEAVY garage jacks, 3½ tons hydraulic on 4 wheels, 2 castors, lift from 6in to 3ft plus 18in screw addition.—Details, Jolley, 117, Queen Victoria Rd., Coventry. [1456

NEW Avondale Swan caravans, 16ft long, 2 doors, end kitchen, lantern roof, now on view at Caravania, Ltd., 200, Cricklewood Broadway, N.W.2. Gladstone 3434. [0207

EX-S/Ldr., transport pilot, leaving to take up appointment, requires aircraft ferry S. Africa/S. Rhodesia, expenses only, familiar route, mod. 1st N. B licence, Dakotas, R/T licence, 2,200 hrs., experienced twins.—Box 5971.

OILSKINS free of coupons; surplus from public utility company and reconditioned as new; suit consists of heavy black oilskin ¾-length coat, interlined, button to neck with storm collar; also heavy black oilskin trousers with seat to be worn over ordinary trousers.

GUARANTEED absolutely waterproof; price 35/- per suit, postage 1/- extra; sou'westers to match 3/9 extra; all sizes available—state chest and waist measurement when ordering; also ex-naval black oilskin coats, full length, at 35/- each, postage 9d.; cash back if dissatisfied.

WILLSON BROTHERS (Dept. 13), Epsom, Surrey. [0410

CARAVANS.—A first-class selection of new and second-hand caravans for permanent homes; super Winchester, 17ft. 6in. Craftsman 16ft., Thomson Kelvin, Rivers, Adams, Eccles, Pilot, Carlight, Ace, and numerous others; prices from £350-£1,600; easy terms; immediate delivery.—X.L. Caravans, Ltd., Blue Star Garage, Maidenhead. Tel. Maidenhead 783. [0405

A CARAVAN "milestone," 25 miles from London Town, not used by Dick Whittington, but already the turning point to freedom of thousands seeking health-giving homes and holidays at Britain's biggest selection of caravans; spotlight: Downland Special £850, 17ft 6in, lantern roof, sliding partition, Pither stove, electric light, and Calor lighting and cooking.—A. S. Jenkinson (member C.D.A.A.), "The" Caravan Distributor, Bath Rd., Taplow, Bucks. Tel. Maidenhead 2610. Easy to reach—right on main Slough-Maidenhead road. Slough and London buses pass door (open always). [0276

ALL coupon free; amazing offers; new and reconditioned Govt. surplus clothing and boots: Ex-African brand new super solid leather Army boots, wide toe (all sizes except 6 and 7), soles sewn and screwed, 25/6; men's brand new off-white macks, super heavy quality, double texture, with belt, smartly cut, 87/6; reconditioned as new, extra heavy quality, quilted Kapok lined Tropal coats, stormproof, 87/6; reconditioned ex-Naval camel wool duffle coats, with hood, full length, pure wool, 50/-; brand new pure wool off-white duffle coats, hip length, storm collar, 2 large patch pockets, 62/6; men's reconditioned transport overcoats, 45/-; ex-Govt. Women's Service overcoats (reconditioned), blue, 29/6; men's reconditioned Army overcoats, up to 38in chest, 17/6; brand new black oilskin jackets and trousers, heavy make, 29/6; ex-American brand new rubberised texture full cut jackets and trousers, wind and stormproof front (the suit), 29/6; brand new oilskin coats, full length, heavy make, 30/-; brand new ex-American officer's battle dress jackets, finest quality serge, 40/-; men's white drill patrol jackets or trousers (each) 10/6; silk Kapok filled flying suit linings, zip fitted, 20/-; ex R.A.F. waterproof flying suits, complete with fur collar, 35/-; ex-W.L.A. velvet cord breeches, up to 28in waist, 16/11; ex-Army reconditioned bush shirts, 7/11; ex-Govt. blue A.R.P. trousers, up to 34in waist (reconditioned), 14/11; U.S.A. denim trousers, up to 34in waist, 7/11; brand new canvas kitbags, 6/11; U.S.A. fleece-lined leather industrial mitts, with finger and thumb, 12/11; ex-R.A.F. leather helmets, 10/6; ex-Govt. brand new super gauntlet gloves, 5/6; brand new fawn canvas lace-up boots, thick rope soles, 8/6; men's thick pure wool seaboot stockings, (per pair) 8/11; ex-American khaki serge trousers, up to 34in waist, 21/1; cash with order; postage and packing, 1/3.

MARCUS'S STORES, Ltd., Gravesend, Kent. [0403

PACKING AND SHIPPING

R. & J. PARK, Ltd., 143-9, Fenchurch St., E.C.2. Tel. Mansion House 2083; official packers and shippers to the aircraft industry. [0012

PUBLIC NOTICES

UNIVERSITY COLLEGE, Southampton.

THE Spitfire Mitchell Memorial Scholarships in Aeronautical Engineering.

APPLICATIONS are invited for two Open Scholarships tenable for three years in the Faculty of Engineering, commencing in Session 1948-49. These will be awarded on the results of a competitive examination and will be open equally to candidates from schools and industry. Further particulars may be obtained from the Assistant Registrar, by whom applications must be received not later than Wednesday, April 14th, 1948. [1460

REUNIONS

ANTEROOM CLUB, 6, Archer St., W.1 (Ger. 9106), has spacious premises in heart of West End suitable for reunions, etc.; bar hrs. 12 to 1, 3 to 11; Sundays, 12 to 2, 6 to 9; reduced rates to serving, ex-service personnel; hon. membership for special circumstances, occasions.—Details from Sec., F/Lt. D. L. Walters, R.A.F.V.R. [1476

PHOTOGRAPHY

AIRCRAFT photographs, 1/3 for sample and list.—19, Violet Gardens, Croydon. [1475

TIME RECORDERS

STAFF time checking and job costing time recorders (all makes) for quick cash sale; exceptional condition.—Box 3654. [0040

TIME recorders; service rental.—Tel. Hop 2239. Time Recorder Supply & Maintenance Co., 157-159, Borough High St., S.E.1. [9777

TUITION

AIRCREW Course?

B.A.N.C.S. of course.

THE British Aeronautical Navigational Correspondence School (B.A.N.C.S.) are specialists in aircrew licences, postal courses, so write to the Secretary, 143a, High St., Hythe, Kent, for the School's free prospectus. [0336

STRAIGHT AVIATION TRAINING.

FLYING and theoretical instruction for pilots and navigators; Central Navigation School, Bush House, accepts students weekly for theoretical and link trainer courses.—Enquiries, Bush House, Temple Bar 2913. [0412

INSTRUMENT rating will soon be necessary for all pilots.

COURSES for this and all pilots and navigators licences are available at

AIR TUTORS, Ayr, Ayrshire. Moderate fees, good accommodation.

OXFORD aircraft and Link trainers, fully equipped for S.B.A., radio range, I.L.S., G.C.A., radio compass at Prestwick Airport. Postal courses for all licences. [0356

SOUTHEND-ON-SEA MUNICIPAL FLYING SCHOOL.

SPECIAL winter week-day rate for Auster aircraft £2 per hour solo or £2/10 per hour dual.

SATURDAY and Sunday rates for Auster and all the-week rates for Tiger Moth aircraft £2/17/6 per hour solo or £3/5 per hour for dual.

NIGHT flying, £4 per hour solo or dual.

LINK Trainer £1 per hour.

NO entrance fee; no subscription.

MUNICIPAL AERODROME, Southend-on-Sea, Essex. Tel. No. Rochford 56204. [0332

BRITISH AVIATION SCHOOL announce the following new Courses:—

MAINTENANCE Engineers' Licences—Category "T," assemble Monday, March 15th. Category "C" assemble Monday, April 19th. Duration of both the above, 4 weeks, fee £15.

SPECIAL Courses for Pilots' "B" Licence.

TECHNICAL Examinations:—

ANSON & Rapide aircraft, assemble Monday, March 9th. Type(s) to be decided later, according to demand, assemble Monday, April 12th. Duration of both courses, 5 days, fee £4. Also Correspondence and Part-Correspondence Tuition for Navigators' and Pilots' Licences, and Link Trainer instruction for Instrument Rating.

LOCAL accommodation bookable through the School.

FOR further particulars, apply:—Chief Instructor, British Aviation School, Blackbushe Airport, Nr. Camberley, Surrey. (Tel. Camberley 1600. Ext. 32.) [0382

THE LONDON SCHOOL OF AIR NAVIGATION announces the following full time courses and commencing dates:—

2ND Nav.—March 8th and April 12th. Modified 1st Nav.—March 22nd and April 19th. 1st Nav. (conversion)—April 12th.

POSTAL tuition and individual coaching for pilots, navigators and engineers ("O" and "X" licences).

62, Great Cumberland Place, W.1. Tel. Pad. 4495. [0277

AIRCRAFT or automobile engineering.—Complete practical and technical training for entry to either industry.—Syllabus from Bursar, College of Automobile and Aeronautical Engineering, College House, Princes Way, Wimbledon, S.W.19. Put. 4107.

ROCHESTER FLYING CLUB specialise in night flying at £4 per hour dual and £3/10 per hour solo in Tiger Moth aircraft, overnight accommodation always available, day rates are £3 dual and £2/15 solo per hour.—The Airport, Rochester. Tel. Bluebell 212. [0395

THE EDUCO TECHNICAL SERVICE, BCM/EDUCO, London, W.C.1; individual postal tuition for Aircraft Engineer Licence examinations, also general aeronautical engineering, metallurgy, aero-engine inspection and allied subjects; write stating requirements. [1376

PILOTS' and navigators' ground training with the personal touch; excellent accommodation and recreational amenities; fees are low, but a pass is still guaranteed; flying training available in the near future.—Hastings School of Air Navigation, 4, Carlisle Parade, Hastings. [0406

WIRELESS Telegraphy; postal course for P.M.G. Certificate for Civil Aircraft, also short courses of instruction at the School, including R/T for Pilot Officers.—Apply The British School of Telegraphy, Ltd., 179, Clapham Rd., London, S.W.9. (Brixton 3487.) Estd. 1906. [0218

MARSHALL'S FLYING SCHOOL trains pilots for A, B or Instructor's licences; dual and solo, hourly rates, £3 for Tiger and Auster aircraft; advanced training available on Proctor or Rapide aircraft; no entrance fees or annual subscription.—The Airport, Cambridge. Tel. 56291. [0245

BRITAIN'S AIR UNIVERSITY courses for the new Flight Navigator's Licence assemble on April 12th, May 18th, June 28th—duration 5 months. Fourteen-week course for conversion from Modified 1st Class Licences assembles March 8th, April 5th, May 18th, August 9th. Special courses in specific subjects arranged to suit individual requirements.—Full details from the Commandant, Air Service Training, Hamble, Southampton. Tel. Hamble 2185.

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TUITION

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AIRCREWS.—B.A.N.C.S. provide concise single lessons at 6/6 (ideal for all conversion courses), complete with illustrations, test paper and tutorial advice to the 1948 I.C.A.O. Navigator's and Transport Pilot's Licence standards; Supplementary Syllabus from Secretary, British Aeronautical Navigational Correspondence School, 143a, High St., Hythe, Kent. [0335

SITUATIONS VACANT

Vacancies advertised are restricted to persons or employments excepted from the provisions of the Control of Engagement Order, 1947.

CIVIL SERVICE COMMISSION.

(1) Naval Cadetships (Special Entry).

(2) First Appointments in the Royal Marines.

(3) Entry to the Royal Military Academy Sandhurst.

(4) Royal Air Force Cadetships.

A combined competition will be held, commencing on the 1st June, 1948. Only those candidates will be admitted from whom the Civil Service Commissioners have received, not later than 18th March, 1948, an application on the prescribed form, in the candidate's own handwriting. Forms of application together with a copy of the Conspectus of the competition may be obtained from the Secretary, Civil Service Commission, Burlington Gardens, London, W.1, quoting No. 2127.

LIMITS of age.

NAVAL Cadetships (Special Entry), 17 years 2 months—18 years 2 month on 1st July, 1948.

FIRST Appointments in the Royal Marines, 17½-18½ on 1st July, 1948.

ENTRY to Royal Military Academy Sandhurst, 17½-18½ on 1st July, 1948.

ROYAL AIR FORCE Cadetships, 17½-19 on 1st July, 1948.

N.B.—Candidates at the Navy, Army and Air Force Entrance Examination of December, 1947, who are eligible and wish to submit an application for the forthcoming examination in case they should prove unsuccessful in the December examination are warned that they are not exempted from the necessity of applying on the prescribed form by the date specified. It will be open to them to withdraw in the event of their success in the earlier competition. [1467

MINISTRY OF CIVIL AVIATION.

APPLICATIONS are invited for appointment as Air Traffic Control Officers Grade III. Candidates should normally be at least 25 and must be under 35 years of age on 1st February, 1948. Applicants below 25 but not less than 23 on the above date will be considered if exceptionally well qualified. Essential qualifications are—mental alertness and balanced judgment, good personality, tact and physical fitness. Experience should comprise extensive flying control service in R.A.F. or F.A.A., preferably with aircrew experience as pilot or navigator. Candidates without flying control experience must have had wide experience as pilot or navigator. Additional assets will be general knowledge of civil aviation legislation and practice, and of radio and radar aids to navigation, possession of 2nd Class Civil Navigator's Licence or a "B" licence.

AIR Traffic Control Officers are required to serve anywhere in the United Kingdom and they are liable to tours of duty abroad.

THE inclusive salary is £460 at age 25 to £540 at age 29 or over rising by annual increments to £750 a year. Inclusive salaries for candidates aged 23 and 24 are £360 and £400 a year respectively.

WHEN final complements are settled establishment will be offered within these complements to suitable officers. Opportunity exists for promotion to Grade II (£750-£900) and Grade I (£900-£1,000).

A form of application may be obtained from the Ministry of Civil Aviation, Establishment Division (B), 10, Fleet Street, London, E.C.4, quoting reference Est./95. The latest date for the receipt of completed application forms is 24th March, 1948. Applications from overseas candidates, if not received by that date, will be considered in connection with vacancies which may arise during the next few months provided that they are received by 21st April, 1948, such application, may be by letter, giving date of birth and full details of qualifications and experience. [1466

BODY makers, coach joiners, screen fitters, required immediately by

JAMES YOUNG, Ltd., Rolls-Royce and Bentley coachbuilders, London Rd., Bromley, Kent. Tel. Ravensbourne 3434. [0322

STRESSMEN required.—Apply, stating qualifications, experience and age, to Personnel Officer, Westland Aircraft, Ltd., Yeovil. [1435

WANTED, ratefixer, preferably with experience of aircraft repair work; must be sound practical man.—Write, giving details to Box 5677. [1399

REQUIRED for civil operating R.A.F. Reserve Flying School, chief store keeper; only fully experienced applicant will be considered.—Box 5994. [1468

SENIOR stressman required.—Please send details of training, experience and salary required to Chief Technician, Gloster Aircraft Co., Ltd., Witcombe, Glos. [0363

WANTED, a chargehand for detail shop; must have previous experience of similar post and/or detail work, thorough knowledge of aircraft materials and alloy welding; also ability to read blue prints.—Applications to Box 5678. [1400

REQUIRED for established charter company, sales executive with past experience and with contacts at home and abroad; excellent prospects for man who can get business; salary and commission will be paid.—Box 5816. [1430

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£1100 down.—**Rapides** fitted with Gipsy Queen III engines, completely overhauled, cabin furnishings and colour scheme to suit purchaser, 12 months C. of A., radio fitted by request, low engine and airframe hours: only a few left for disposal.

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REQUIRED experienced Air Freight Clerk; write in confidence giving details of experience, age, salary required.—Box No. A.B.817, c/o Central News, 17, Moorgate, London, E.C.2. [1407

A limited number of ground engineers, holding A and C licences, required for servicing Viking aircraft overseas.—Apply by telephone or in writing to Labour Manager, Vickers-Armstrongs, Ltd., Weybridge. [1457

APPLICATIONS are invited from senior draughtsmen and stressmen.—Apply in writing or by telephone to Labour Manager, Vickers-Armstrongs, Ltd., Weybridge Works, Weybridge. Tel. Byfleet 240. [1309

INDIAN NATIONAL AIRWAYS have a few vacancies for "B" licence pilots of Indian nationality. —Please write to Manager, Air Department, Indian National Airways, Malhotra Building, New Delhi. [1459

RATEFIXER required by large aircraft firm in the West London area, successful applicant must be capable of pricing a large and varied range of work in experimental machine shop.—Write stating experience and salary required to Box 5968. [1462

THE DE HAVILLAND ENGINE Co., Ltd., require design and detail draughtsmen, preferably with experience in gas turbine and/or reciprocating engines. —Apply Personnel Office, De Havilland Engine Co., Ltd., Stag Lane, Edgware, Middx. [0400

AIRCRAFT firm (Midlands) require additional technical staff for programme of very interesting work, vacancies include stressmen, aerodynamicists, senior and junior draughtsmen.—Apply, stating age, qualifications and experience, to Box 5835. [1446

TECHNICAL author required; experience in preparation of Air Ministry hand-books and technical leaflets essential.—Applications in writing to Personnel Manager, Percival Aircraft, Ltd., Luton Airport, Beds., stating age, experience and salary required. [0408

SAUNDERS-ROE, Limited, have vacancies for senior design draughtsmen, stressmen and aerodynamicists.—Applications stating age, qualifications, experience and salary expected should be sent to Personnel Officer, Saunders-Roe, Limited, East Cowes, Isle of Wight. [0394

JIG and tool draughtsmen; senior jig and tool draughtsman with sheet metal, planning and tooling experience, and two experienced jig and tool draughtsmen required.—Apply Personnel Office, The De Havilland Engine Co., Ltd., Stag Lane, Edgware, Middx. [0404

ENGINEER with A, C and X licences covering Rapider, capable of running Charter Co.'s fleet of Dominie aircraft at Ronaldsway Airport, Isle of man, position offers great scope to person with ability and initiative, commencing salary £440 per annum.—Box 5837 [1448

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THE ENGLISH ELECTRIC Co., Ltd., aircraft division, have vacancies in their airworthiness dept. for ladies with inter. or final degree in engineering or mathematics; apply stating age, experience and salary required to the Chief Draughtsman, English Electric Co., Ltd., Aircraft Division, Corporation St., Preston.

AIRCRAFT development fitter required by East Anglian Company, must possess minimum of 8 years experience in aircraft assembly-fitting, preferably in development department of aircraft factory and have served apprenticeship in this trade.—Write, stating age, full particulars of experience, etc., to Box 5996. [1472

REQUIRED immediately, experienced test engineer to take charge of structural, mechanical and hydraulic development tests; engineering degree or equivalent essential.—Applications giving full particulars of training and experience to be addressed to The Secretary, Boulton Paul Aircraft, Ltd., Wolverhampton. [1480

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SITUATIONS VACANT

THE FAIREY AVIATION COMPANY, Ltd., Hayes, Middlesex, having a progressive and expanding programme in a wide field of aeronautics, invites applications from aerodynamicists, and stress analysts with initiative and enterprise and upwards of three years' experience; there are also a few vacancies for juniors with a knowledge of theory and design of structures, 38-hour 5-day week, pension scheme.—Apply, stating age, experience and salary required, to the Personnel Manager. [1455

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